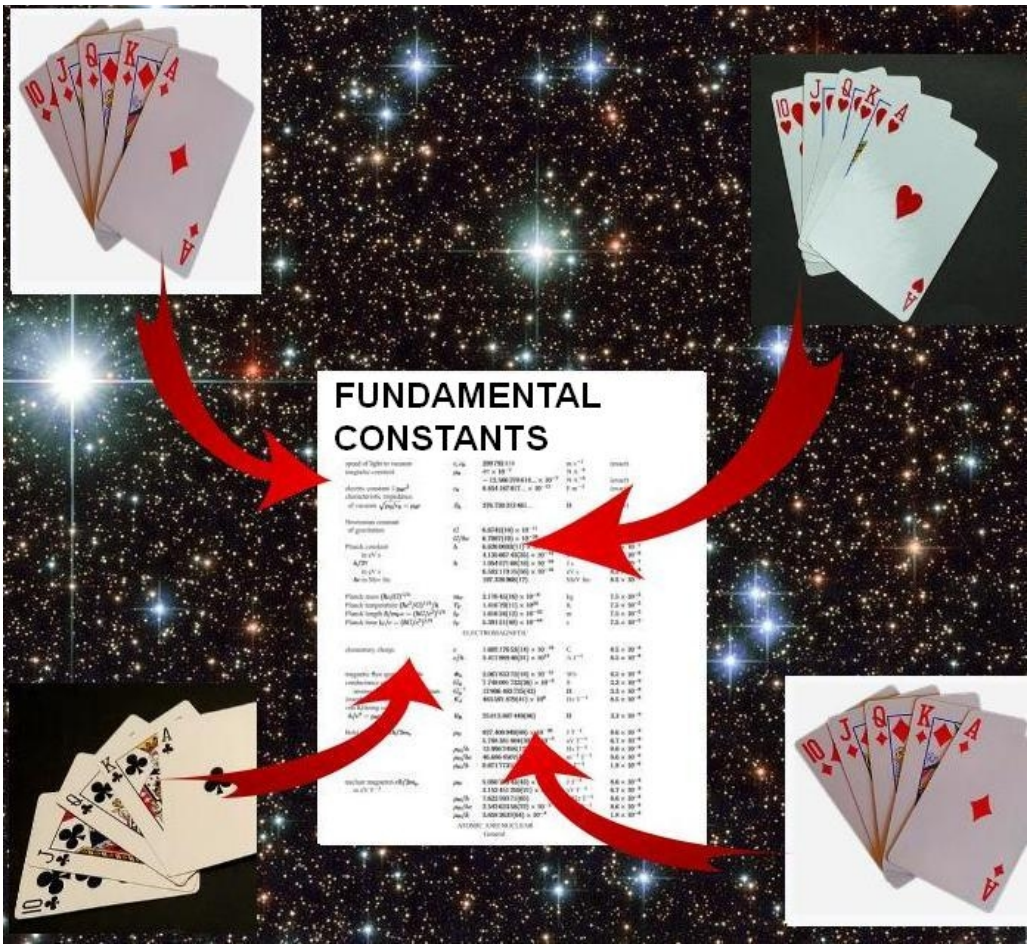
BIOLOGICAL AND COSMIC FINE-TUNING



Mark Mahin

New York, 2020

The online book you are reading consists of posts that appeared between 2013 and 2020 on my "Future and Cosmos" blog at www.futureandcosmos.blogspot.com. The posts all relate in one way or another to the topic of fine-tuning in nature: either biological fine-tuning or cosmic fine-tuning.

Biological fine-tuning is what we see when organisms have "just right" features and incredibly complex functional components and systems exceedingly unlikely to have arisen by chance or any accidental processes. Cosmic fine-tuning is what occurs when the universe as a whole has characteristics and constants that are "just right" in the sense of allowing the universe to be habitable, against all odds. Some examples of cosmic fine-tuning are historical, involving conditions billions of years ago that were just precisely right (against all odds) so that we could end up with a habitable universe (an example being the fine-tuned initial expansion rate of the universe). Other examples of cosmic fine-tuning are not merely historical, but involve permanent features of the universe that (defying enormous odds) allow the universe to be habitable. Such examples of permanent cosmic fine-tuning can mainly be found by examining ways in which the laws and fundamental constants of the universe have vastly improbable characteristics allowing the universe to be habitable.

For many decades there have been certain individuals who have tried very hard to explain away all of this biological and cosmic fine-tuning, by presenting theories trying to explain how such fine-tuning might have naturally arisen by blind accidental processes, or might exist by pure chance. A great deal of the

discussion in this book will be devoted to criticizing such theories, which typically are of very poor quality. For example, I devote quite a few pages to a critique of a theory called the cosmic inflation theory (not to be confused with the more general Big Bang theory), which arose almost entirely for the purpose of trying to explain away very dramatic fine-tuning in the early conditions of the universe.

To some extent this book will show an evolution of my own thought, as I studied more and more on the related topics between 2013 and 2020. For example, my posts in 2013 may assume a few commonly made claims which I later rejected after further study.

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Tuesday, October 13, 2020

They Claim Thousands Yielded Macroevolution, But Billions Did Not Yield It

A recent story on the phys.org site creates a wrong impression. Referring to some study about the number of people who have a particular artery in the arm, the story states, "Dr. Teghan Lucas from Flinders University says this study into the prevalence of the artery over generations shows that modern humans are evolving at a faster rate than at any point in the past 250 years." But the real truth is that macroevolution (the appearance of complex visible new biological innovations) is failing to appear from the human population, to an extent that should cause great doubt about claims of a merely Darwinian evolutionary origin of human beings.

The median artery is an arm artery that appears early in the development of a human, but normally disappears or changes into some other arterial structure. The phys.org story cites a study claiming that while there used to be only 10% with such an artery in the nineteenth century, there are now about 30% with such an artery. But the medical reference here claims that only 10% of people living now have such an artery. And the autopsy study here of 60 people in 2012 found only 6.6% of the arms studied had such a median artery. The 2015 autopsy study here found only 6 out of 100 cadavers had a median artery. So how can a new study be claiming that 30% of us nowadays have a median artery?

In any case, it makes very little difference whether more people nowadays have such an artery. There is no clear survival or reproduction benefit from having such an artery as opposed to alternate arterial structures, so citing it as evidence for natural selection is very dubious. Nowadays having a median artery is associated with the troubling problem of carpal tunnel syndrome. And even if there were to be more people with such a median artery, it would be a mere example of microevolution, not macroevolution. Microevolution is some minor tweak in an organism that is not any major complex visible biological innovation.

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► September (8)
► August (8)
► July (8)
► June (8)
► May (8)
► April (8)
► March (9)

We know of a few minor examples of microevolution occurring in humans, such as the ability of more humans to digest lactose, and the ability of some humans to breathe better at high altitudes. But no one has ever observed macroevolution in the human population. Macroevolution is the alleged appearance of major complex visible biological innovations in organisms due to natural evolutionary processes. For example, if a species that did not have wings once evolved into a species that did have wings, that would be an example of macroevolution. And if a species that did not have eyes ever evolved into a species that did have eyes, that would be an example of macroevolution.

Recorded history provides no example of macroevolution occurring in the human population. We have Egyptian statues and bas-reliefs of humans dating from 5000 years ago, and the humans depicted look just like the humans of today. We have priceless ancient literary works such as those of Plato, proving that humans were capable of brilliant thought and writing thousands of years ago. If humans from five thousand years ago were transported to the current age, they could pass for modern humans.

Evolutionary biologists claim there was in the past some huge amount of macroevolution that caused rather ape-like ancestors to transform into humans capable of speech, writing and city building. But a study of the growth of human population will cast doubt on such claims.

The number of humans that have lived has been estimated at 100 billion. But a web site discussing this issue tells us that 99% of these people have lived in the past 10,000 years. Since 8000 BC some 100 billion humans have lived, but in the period between about 400,000 BC and 8000 BC, the total number of humans or pre-humans who lived was quite probably no greater than about a billion, and very probably less than 3 billion (the average population size being only about 20,000 or smaller for most of this time). The web site discussing the issue states at 8000 B.C. the total number of humans who had ever lived was only about a billion.

But we know there has been no macroevolution of humans since 8000 BC -- only a little microevolution like better lactose

- February (7)
- January (8)

- 2019 (95)
- 2018 (93)
- 2017 (92)
- 2016 (92)
- 2015 (97)
- 2014 (163)
- 2013 (166)

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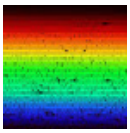
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Ten Fumbles of the "Evolution 101" Web Pages

When an Apparition Is Seen by Not Just One

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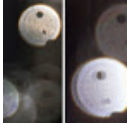
digestion and better high-altitude breathing in some people. A statue from about 9000 BC shows a human with the modern human form, as do skulls and skeletons from around such a time. We also know from archeological records that humans were building towns around such a time, in places such as Jericho. We also know from cave paintings that something like modern humans existed around 30,000 B.C.

So if you believe the conventional account, you must believe that a totality of no more than 3 billion humans or pre-humans living before 8000 B.C. underwent enormous macroevolution (resulting in humans that had language, abstract thinking and symbolic abilities), but that in 100 billion humans living since 8000 BC there has been no such macroevolution. Such an idea is not credible. Why would there be such dramatic macroevolution during less than 3 billion lives, and no macroevolution during the subsequent period in which there were 100 billion human lives? We would think the opposite would be more likely.

A science site says, "An effective population size of 10,000 has been estimated for the most recent common ancestor of modern humans and of Neandertals (Ptak et al., cited in Premo and Hublin, 2009)." Conversely, our planet has had billions of humans for about 70 years. According to the account of our evolutionary biologists, from a population of only about 10,000 or a few tens of thousands of organisms before 50,000 B.C. there came some dramatic burst of macroevolution transforming ape-men into humans, but no such macroevolution has come from any of a population of billions of humans living in modern times. This claim is as fishy as the recent claim that the number of humans with a median artery has sharply increased, contrary to those two autopsy studies I mentioned.

Below is a table summarizing various studies or claims relating to the prevalence of the median artery in the forearm:

Source	Date	What Percent Had a Persistent Median Artery
"Prevalence of the Persistent Median Artery", an autopsy study of 60 corpses	2012	6.60%
"Persistent median artery of the forearm and palm:	2015	"A large, well developed persistent median artery extended to the palm and contributed to its



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a cadaver study into its origin, course, fate and clinical significance”		vascular supply in 6 out of 100 upper limbs dissected.”
“Prevalence of Bifid Median Nerves and Persistent Median Arteries and their Association with Carpal Tunnel Syndrome in a Sample of Latino Poultry Processors and Other Manual Workers”	2010	"We screened 1026 wrists of 513 Latino manual laborers in North Carolina for bifid median nerves and persistent median arteries using electrodiagnosis and ultrasound...3.7% of wrists had a persistent median artery independent of subgroup ethnicity, age, gender, or type of work."
“Recently increased prevalence of the human median artery of the forearm: A microevolutionary change”	2020	“A total of 26 median arteries were found in 78 upper limbs... a prevalence rate of 33.3%”

Altogether this data presents no real evidence that persistent median arteries in the arm are becoming more prevalent. The attempt of the last of these papers (the Flinders University study) to sell their outlier result as evidence of recent microevolution is unfounded, and their sample involving only 78 limbs is much less reliable than the 13 times larger sample of the 2010 study finding a prevalance of persistent median

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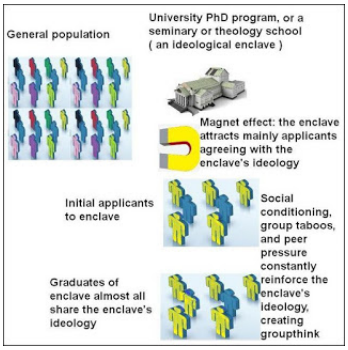

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- 3D printing (1)
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arteries only one tenth of what the Flinders University study found (a prevalance of only 3.7%). We seem to have here an example of the "cherry-picking for Charles" that is done so often by Darwinism enthusiasts.

When discussing the unlikelihood of getting dramatic macroevolution from a small population, and the relation of population size to the likelihood of there appearing large complex evolutionary innovations, our biologists try their best to cloud the waters by distracting us with side points. But the matter will be more clear to anyone who considers a hypothetical example. Requiring almost infinitely improbable protein molecule innovations and so much more, the appearance of a macroevolution innovation largely by random mutations can be compared to some typing monkey accidentally producing a brilliant essay or a clever computer program. Now imagine if some huge group of scientists tested for years *billions* of monkeys trained to sit at keyboards and type, and saw no such worthy outputs ever appearing from their efforts. It would then be very dubious for such scientists to claim that such worthy outputs came in the past from a group of only about 15,000 such typing monkeys. It is just as dubious to claim that some tiny population of perhaps 15,000 yielded some gigantic marvel of macroevolution, when no macroevolution at all has come from population sizes 300,000 times larger.

Posted by Mark Mahin at 7:42 AM No comments:

Labels: Darwinism, evolution, origin of man, origin of Mind, overblown hype

Wednesday, September 23, 2020

Ten Fumbles of the "Evolution 101" Web Pages

This is a year in which leading biology authorities have displayed astonishing incompetence about simple matters relating to the coronavirus. As discussed in my posts here and here, such authorities have been stumbling around all over the place in what we might call a comedy of errors, were not the results of their confusion so deadly. The latest twist this week is that the Center for Disease Control issued a statement finally describing coronavirus as airborne, causing many to say, "It's about bloody time." But then a few days later the CDC reversed their new position, saying it was an error. NBC News says, "The move is yet another misstep for the nation's leading public health agency, which recently reversed its guidance for the second time on testing asymptomatic people for the coronavirus."

A year in which there have been so many huge errors by our biology authorities regarding elementary matters pertaining to coronavirus may be a good year for us to take a hard critical look at web sites in which biology authorities are boasting of their deep understanding of matters a thousand times more

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

subtle and complex. So let's take a close look at the core of the very widely read "Understanding Evolution" web site, and some places that its treatment is inadequate, scrambled or misleading. The heart of the site is a group of pages called "Evolution 101" which you can reach at this page (the page here gives a Table of Contents for this "Evolution 101" set of web pages). My comments below refer solely to the pages under this "Evolution 101" tab heading (the pages listed in the Table of Contents link just given), and when I refer below to "the site" or "the Evolution 101 site" I refer only to that set of pages.

Fumble #1: The Definition of Evolution Very Soon Replaced with a Vastly Different Definition

On an early page on the site, entitled "Introduction to Evolution," there appears a definition of evolution. We are told "Biological evolution, simply put, is descent with modification." Very strangely the site fails to explain what that term means. It will certainly not be obvious to the average reader what exactly is meant by "descent with modification." Another site states, "Descent with modification refers to the passing on of traits from parent organisms to their offspring." But that's biological inheritance, not evolution.

In fact, there are many different definitions of evolution. When someone refers to "evolution," he may be referring to any of the following things:

- the mere vague idea that change occurs over time
- the more specific idea that gene pools change over time
- the idea that organisms inherit some random mutations that originated in their parents or an earlier ancestor
- the idea that small changes gradually occur in the physical characteristics of an organism because of changes in gene pools that are passed on
- the idea that dramatic new biological innovations such as eyes, ears, wings and complex brains have appeared from merely accidental effects such as random mutations and so-called natural selection
- common descent, the idea that all organisms are descended from a common ancestor

I may note that the last of these definitions of evolution is an unproven claim more than 1000 times harder to prove than the first two of these propositions.

What is very strange is that just after defining evolution in one way, the page then very quickly changes its definition. A few lines after saying, "Biological evolution, simply put, is descent with modification," the page says, "The central idea of biological

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

evolution is that all life on Earth shares a common ancestor." But that idea is an idea more than a thousand times harder to prove than the mere idea of "descent with modification." You can believe in descent with modification without believing that all life on Earth shares a common ancestor.

So the "Evolution 101" site fumbles very early in the game, by changing its definition of evolution very quickly after it first offered a definition of evolution, changing from one definition of evolution to a vastly different definition.

Fumble #2: The Super-skimpy "How We Know What Happened" Page

A crucial page of the site has the title "How We Know What Happened When." The page is absurdly skimpy, offering only three lines mentioning (but not explaining) radiometric dating, stratigraphy, and molecular clocks. The topic of molecular clocks is quite controversial, with some of the molecular clocks disagreeing with the results from radiometric dating. There are also disagreements on how to calculate a molecular clock, or whether molecules even offer anything like a precise clock as to when or why things happened. Radiometric dating tells us about the age of fossils, but does nothing in itself to establish an ancestry of species. So from this page we are not at all assured that biologists "know what happened" millions of years ago.

Fumble #3: The Giant Omission of the "Important Events in the History of Life" Page

The page here is supposed to educate us about important events in the history of life. What we have is a visual that allows us to point to various positions on a widget, and read some text. If you click around on the widget, you will be told the following timeline.

3800 million years ago: Replicating molecules (the precursors of DNA) form.
3500 million years ago: Unicellular life appears.
555 million years ago: Multi-cellular marine organisms are common.
500 million years ago: Fish-like vertebrates evolve, and invertebrates, such as trilobites...are common in the ocean.

The chronology does not consist only of scientific facts. There are very good reasons for rejecting all claims that unicellular life was preceded by self-replicating molecules. A recent scientific study published in the journal Nature says that self-replicating RNA would require more than 40 chemical subunits arranged in just the right way, and concludes that we would not expect such a thing to happen by chance in the history of the observable universe.

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

This timeline almost entirely conceals the great truth of the Cambrian Explosion. The largest classification group of animals is called a phylum. The Cambrian Explosion was a relatively brief period of time during which almost all animal phyla appeared rather suddenly. The fact of such a thing has always been a gigantic explanatory problem for Darwinism, because it contradicts the predictions of Darwinists. If biological innovations appear very gradually because of slow evolution caused by random mutations, then we would expect the animal phyla to have gradually appeared over many hundreds of millions of years. Instead, almost all of the animal phyla appeared within a Cambrian Explosion lasting no more than about 20 million years.

By failing to notify its readers about this issue, the "Evolution 101" site reads like a site that has no answer to such a difficulty, and a site that is trying to hide this huge difficulty from its readers.

Fumble #4: The "Mechanisms of Change" Page Mentioning Only Superficial Color Changes

The "Evolution 101" web site has a page entitled "Mechanisms of Change." It has the purpose of trying to explain for us some mechanism by which evolution could produce changes in organisms. Unfortunately, all of the examples given refer only to the most trivial type of microevolution: a change in the color of bugs. There are no examples explaining how any of these mechanisms could produce a complex change such as the appearance of a new protein, a new organ, a new appendage or a new organ system.

Fumble #5: The Misleading Page on Mutations

On the page here, the "Evolution 101" site tells us about mutations. It states, "Mutations can be beneficial, neutral, or harmful for the organism," without telling us the important fact that virtually all mutations are harmful or neutral (which means neither helpful nor beneficial). In fact, it is all but impossible to imagine how a single genetic mutation could be beneficial.

You can get a good analogy by imagining a person who has carefully typed a computer program that accomplishes some particular task. Imagine the person has the text for that computer program in a text editor running on his computer. Now, suppose the person clicks on a random position on that text, and then closes his eyes, typing a random keystroke. That is a very good analogy for what a random mutation is. In this case, almost certainly the random keystroke or random mutation will have no benefit in the computer program, or produce a harmful effect (such as preventing the code from running successfully). Tremendous luck would be required for the random keystroke to actually improve the computer

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

program that was being written. Similarly, the chance of a random mutation producing a beneficial effect is very many times smaller than the chance of a random mutation producing a harmful effect.

But the "Evolution 101" site has not told about this very important reality.

Fumble #6: The Misleading Page on Development

On the page here, the "Evolution 101" site clumsily describes development as "Development is the process through which an embryo becomes an adult organism and eventually dies" (strangely including death as part of development, unlike almost all writers). The page says, "Through development, an organism's genotype is expressed as a phenotype." But a phenotype is not an expression of a genotype, and a genotype does not specify a phenotype. Nowhere in the genotype does it state that humans have one head, two eyes, two ears, one back, two legs and two arms. Nowhere in a genotype (DNA) do we have a specification of any of the organs or appendages of an organism. Nowhere in a genotype (DNA) do we have a specification of how to make any of the 200 cell types used by humans. The genotype does not even specify how to make the organelles that make up a cell. As a recent article in The Scientist concisely puts it, "Genomes are not a blueprint for anatomy."

Type of information	Can it be specified in DNA?
Linear amino acid sequence of a protein molecule	Yes
Three-dimensional shape of a protein molecule	No
Exact location where a protein is located in body	No
Layout of a cell organelle	No
Layout of a cell	No
Layout of a tissue type	No
Layout of an organ	No
Layout of an organ system	No
Layout of a full body plan	No
Structure progression from simplest tiniest form to fully grown form	No
Dynamic behavior inside an organism during a particular month or year	No

By telling us that a phenotype of an organism is an expression of the genotype, the "Evolution 101" web site is repeating the Great DNA Myth, the gigantic untruth that DNA is a specification of how to make a particular organism. There are several ways in

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

which this false myth can be told:

"DNA is a blueprint for an organism."
"DNA is a recipe for making an organism."
"DNA is a program for making an organism."
"A phenotype is an expression of a genotype."
"The genome has all the information needed for development."

All of these statements are false. DNA is not a blueprint or a recipe for making an organism, and does not even specify how to make any of the cells of an organism. While a phenotype (the observable characteristics of an organism) are influenced by a genotype (the DNA of an organism), such a phenotype is not at all an expression of a genotype because the genotype only specifies low-level chemical information, not high-level structural information. In the post here you can read quotes by more than 15 distinguished authorities (mostly PhD's) who say that DNA is neither a blueprint nor a recipe for making an organism.

Why do some biologists keep telling us the untruth that DNA is a blueprint or recipe for making an organism? Because it's the misstatement they need to make, given their previous boasts. If DNA is not a recipe or blueprint for making an organism, then we cannot explain one species gradually changing into some vastly different species by imagining gradual changes in DNA, and there can be no genetic explanation for how large-scale macroevolution can naturally occur.

Fumble #7: The Pages on Natural Selection

On the page here, the "Evolution 101" site discusses natural selection. We have some examples trying to describe how natural selection could occur. But all of the examples mention only superficial color changes.

The next page is called "Natural Selection at Work." We are told "Any coffee table book about natural history will overwhelm you with full-page glossies depicting amazing adaptations produced by natural selection." Now the site is attempting to convince us that very complex biological innovations have been produced by natural selection. But the site has not done anything to explain how that could occur. The examples on this page and the previous page only explained how superficial color changes in an organism might be helped along by natural selection. The page mentions two other cases: the darkening of moths called industrial melanism (another example of a mere superficial color change), and the variation of beaks in Galapagos finches. Neither of these is a case of an impressive biological innovation. The Galapagos finches already had beaks, and if so-called natural selection caused a variation in such beaks, that is not a case of a novel biological innovation that can be compared to

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

innovations such as the appearance of wings and vision systems.

A later page on the site entitled "Adaption" talks about impressive biological innovations in nature such as echolocation, the kind of "radar" used by bats. No discussion is given about how such innovations could be produced by natural selection or evolution. Then on the next page, we read this: "Because natural selection can produce amazing adaptations, it's tempting to think of it as an all-powerful force." But the site has done nothing whatsoever to show that natural selection can produce any adaptations other than superficial color changes. The site simply leaps from a discussion of trivial unimpressive adaptions to the claim that "natural selection can produce amazing adaptations," without doing anything to explain how that could occur.

On the same page, we have a misstatement. We are told, "Natural selection is NOT random!" But natural selection as imagined by Darwinists certainly is random. When I do a Google search for "defintion of random," I first get this definition: "made, done, happening, or chosen without method or conscious decision." The Cambridge Dictionary defines random as "happening, done, or chosen by chance rather than according to a plan." Natural selection as imagined by Darwinists does match that definition, so it is indeed random. I may also note that since Darwinists do not actually believe that nature is consciously making a choice when natural selection occurs, the very term "natural selection" is a misleading term. Instead of using it, Darwinists should refer to "survival of the fittest" or "the superior reproduction rate of fitter organisms."

Because Darwinists do not actually believe that nature makes conscious choices, they speak in a misleading way every single time they use the phrase "natural selection." When Darwinists say things like "natural selection is not random," they are being doubly misleading in their speech, by: (1) referring to something that does not involve a choice as "selection," (2) referring to something they believe is not according to a plan as "not random."

Fumble #8: The "Causes of Speciation" Page

The page here is entitled "Causes of Speciation." Speciation is the appearance of new species. The page lists only two causes: geographic isolation and reduction of gene flow.

Geographic isolation does nothing to explain how new biological innovations could occur. As for "reduction of gene flow," the page notes that such a thing "may or may not be sufficient to cause speciation," which hardly sounds like confidence. To explain the origin of species with dramatic new biological innovations, we need to have an explanation for the

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

appearance of new genes, and a burst of new biological information. That certainly isn't covered by “reduction of gene flow.”

We are left with the impression that our experts have no real explanation for the origin of new species.

Fumble #9: The Laughable Discussion of Macroevolution

On the page here, the “Evolution 101” site discussed macroevolution. Macroevolution means the appearance of dramatic new biological innovations such as eyes and wings, not just the superficial, unimpressive changes such as color changes (which are referred to as microevolution). The page does nothing to credibly explain how macroevolution can be produced. It merely states an equation:

"Mutation+Gene flow+genetic drift+natural selection+3.8 billion years = macroevolution"

But it does not at all follow that the things on the left of the “equal sign” in that equation should produce macroevolution. And the page does nothing to back up such a claim. Moreover, since almost all animal phyla appeared during the relatively short time span of the Cambrian Explosion (lasting no more than about 20 million years), it is quite laughable for the "Evolution 101" site to be giving some equation implying that macroevolution requires 3.8 billion years (a length of time 190 times longer than 20 million years).

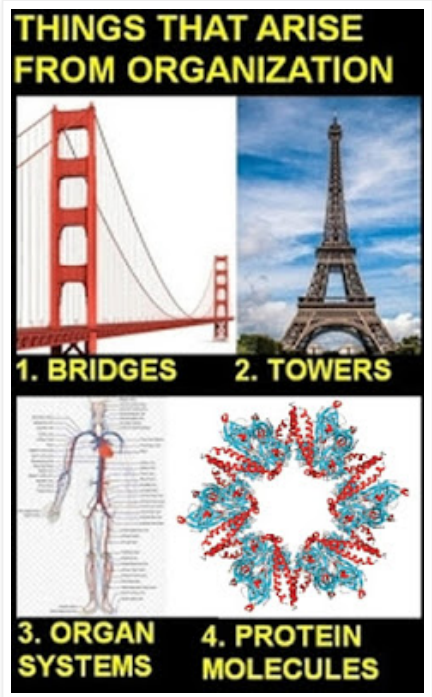
The page makes this statement:

"A process like mutation might seem too small-scale to influence a pattern as amazing as the beetle radiation, or as large as the difference between dogs and pine trees, but it's not. Life on Earth has been accumulating mutations and passing them through the filter of natural selection for 3.8 billion years — more than enough time for evolutionary processes to produce its grand history."

To explain macroevolution, and the appearance of dramatic new biological innovations, we need to explain mountainous amounts of organization. Organization is something entirely different from accumulation. The idea that you can accumulate your way to fantastically high levels of organization is utterly fallacious.

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

Organization is something vastly more complicated and more hard-to-explain than accumulation. A snow drift next to your car is an example of accumulation; your car itself is an example of organization. As an evolutionary biologist confessed a while ago, referring to the "modern synthesis" that is Darwinism combined with genetics, "Indeed, the MS [modern synthesis] theory lacks a theory of organization that can account for the characteristic features of phenotypic evolution, such as novelty, modularity, homology, homoplasy or the origin of lineage-defining body plans."



Protein image credit: RCSB Protein Data Bank.

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

In fact, we know of a very good reason why random mutations would never accumulate to become extremely complex functional innovations. The reason is that a random mutation is merely a tiny fragment of what is needed for a functional innovation. Since a random mutation is such a tiny fragment of what is needed for a biological innovation, 99.9999% of such mutations should fail to produce any survival benefit. Far from accumulating in a gene pool, such not-yet-beneficial mutations should drift out of a gene pool, according to Darwin's principle that natural selection is always discarding what is not beneficial.

On the page here, the "Evolution 101" site gives away that evolutionary biologists really have no understanding of how complex biological innovations can arise. The page lists four "questions that evolutionary biologists are trying to answer," and one of these is "How does evolution produce new and complex features?" If evolutionary biologists do not currently understand how evolution can "produce new and complex features," they have no business asserting claims that all organisms have a common ancestor, and no business asserting claims that humans are descended from any other organism.

Fumble #10: The Final Insult of "Looking at Complexity"

In the second to last page in the "Evolution 101" site, we have a page entitled "Looking at Complexity." But nowhere does the "Evolution 101" set of web pages (referred to below as "the site") honestly discuss the mountainous complexity of living things. Most notably:

1. The site has had no mention of facts such as the fact that humans are built from more than 20,000 different types of protein molecules, each of which is a very complex innovation.
2. The site has had no mention of the incredible complexity of protein molecules, and how they only become functional when they have a very rare and hard-to-achieve state that allows protein folding to occur.
3. The site has no mention of the incredible complexity of cells, which are so complex that they have been compared to small cities or factories.
4. The site has no mention of the fact that human organisms require about 200 different types of cells, each different type a separate marvel of biological innovation.
5. The site has had no mention of the incredibly fine-tuned complexity of complex systems such as the human vision system, the human reproduction system, and the human cardiovascular system.

The site has not even discussed the complexity of protein molecules. Most protein molecules in the human body consist of more than 300 amino acids arranged in the right way to acheive some specific functional effect. Each of these proteins is as complex an invention as a 60-line computer program, and a large fraction of these proteins are as complex as a 200-line computer program. We have in our bodies more than 20,000 different types of protein molecules, each of which is a separate invention as complex (and unlikely to appear by chance) as a 60-line computer program that achieves a particular functional result.

Biological organisms have mountainous levels of complexity and organization. A human being is a far more impressive piece of functional complexity than an aircraft carrier. We understand exactly how to put together an aircraft carrier piece-by-piece, but no one understands how to put together a human being atom-by-atom or molecule-by-molecule. The human body is only one of countless such wonders of organization in the biological world. Atoms are organized into amino acids, which are organized into polypeptide chains, which are organized into protein molecules with three-dimensional shapes, which are organized into organelles, which are organized into cells, which are organized into tissues, which are organized into organs, which are organized into organ systems, which are organized into organisms.

To explain such staggering marvels of hierarchical organization, you need a theory of organization. Darwinism is no such thing. Darwinism is a mere theory of accumulation that gets by through the use of a word trick (the misleading phrase "natural selection" to describe something that is not actually selection or choosing), and by making gigantically inaccurate claims that DNA is something like a blueprint or recipe or program for making an organism. Because Darwinists do not really have any theory of biological organization, it is necessary for them to avoid speaking candidly about the vast amounts of organization and fine-tuning in living things. And so we have sites like the "Evolution 101" web site that never tell us about how complex organisms are.

The credibility of Darwinism as an explanation for organisms is inversely proportional to the degree of organization and dynamic functional complexity in organisms. The richer the functional complexity and organization of organisms, the less credible Darwinism is as an explanation for such organisms. So the champions of Darwinism tend, in various ways, to engage in a kind of complexity concealment, in which the reader is not informed of supremely relevant facts that would allow him to correctly conclude that the organization and functional complexity of living organisms is greater than in anything humans have ever constructed with their hands.

The "Evolution 101" website is currently almost unreadable by any but the most patient, because whenever you go to a page on it, you get an annoying pop-up nagging you to fill out some "short survey" that will be used to redesign the site (a survey that turns out to be a hassle to fill out). Given all the issues I have discussed, I understand why someone might feel a need to redesign the site.

Postscript: Now in October 2020 the CDC is declaring COVID-19 can be transmitted by airborne transmission, correcting their previous "correction."

Posted by Mark Mahin at 7:50 AM No comments:

Labels: Darwinism, evolution, natural history, natural selection

Tuesday, September 8, 2020

What Would It Take to Confirm Gradualism?

There are three aspects of Darwinism: (1) common descent, the idea that all life is descended from a common ancestor ; (2) gradualism, the idea that species gradually change over eons into very different species with very different physical structures; (3) the idea that biological innovations occur because of a combination of natural selection and random mutations. None of these claims has been proven.

We have no proof of the doctrine of common descent. The fact that all life uses the same genetic code is not at all proof that all life descended from the same ancestor. If some divine creator or series of extraterrestrial expeditions to Earth had decided to populate our planet with organisms, such a force might well have chosen to introduce organisms with a common genetic code, so that a harmonious ecosystem could develop, without organisms getting poisoned because they fed on some other organism with a different genetic code.

We also have no proof for the doctrine of gradualism. Humans have never observed any species change gradually from one biological form to a very different biological form with a very different structure. We do not have proof that any species gradually changed into some very different species before human civilization started. If you think that things such as fossils of anthropoid organisms are proof of such a thing, you may read this post for a discussion of why they are not.

We also have no proof at all for the claim that any complex visible biological innovation has ever appeared because of random mutations, natural selection, or any combination of these two things. In fact, humans have never even observed the appearance of any complex new biological innovation that was visible to the naked eye. I do not count something such as industrial melanism as such a thing, because such a darkening of moths is not a new complex innovation, and because it has not been proven that there did not previously exist some dark moths before such a change in the gene pool occurred.

Much as some might like to get proof for the claims of Darwinism by examining the past, such a thing is not currently possible. Given two old fossils from different geological eras, there is no way of knowing whether they show one organism descended from another. The half-life of DNA is only 521 years, which means that we do not have anything like complete DNA corresponding to most old fossils. When a very old fossil is found, scientists usually have no more than a tiny fraction of the DNA of the organism that had such bones.

So Darwinism is very much an unproven thing, something that seems more like a belief system than something established by observations. But could there be any observations that might change this situation, and allow us to say that Darwinism was well confirmed? I can imagine a type of experiment that could bolster the empirical credentials of Darwinism. It is an experiment that would be incredibly expensive, and which would need to be carried out for very many generations.

Let us imagine the construction of a special laboratory that would be much bigger than a single building in a university. The laboratory might be as big as a modern zoo. Inside this laboratory-zoo there would live some particular mammal species. That species might be dogs, lions, bears or some other large mammal. A variety of different habitats might be constructed for the animal species to live in. These habitats might be separated, so that there would be a variety of study groups, each living in a different habitat.

The experiment would simply be to monitor the species over very many generations, to find out whether there was any example of visible innovative evolution. The different habitats might have different characteristics designed to increase the likelihood of dramatic evolutionary innovations.

For example, if the species being tested was dogs, we might have habitats such as the following:

1. One habitat resembling Hawaii, and with little radiation.
2. One habitat resembling northern Canada, and with little radiation.
3. One habitat resembling the Amazon forest, and with little radiation.
4. One habitat resembling a desert, and with little radiation.
5. One habitat resembling the Great Plains of the United States, and with little radiation.
6. One habitat resembling a European forest, and with little radiation.
7. One habitat resembling Hawaii, and with lots of radiation.
8. One habitat resembling northern Canada, and with lots of radiation.

9. One habitat resembling the Amazon forest, and with lots of radiation.
10. One habitat resembling a desert, and with lots of radiation.
11. One habitat resembling the Great Plains of the United States, and with lots of radiation.
12. One habitat resembling a European forest, and with lots of radiation.

The idea would be to observe the species in these different habitats, and see whether any complex biological innovations occurred because of random mutations and natural selection. The habitats with higher levels of radiation might have an increased number of random mutations. By having different habitats you could test the Darwinian idea that organisms gradually change their structure to adapt to their habitats.

But it would not be sufficient to merely observe whether any new visible innovations appeared in the biology of this species. You also would have to determine whether such a thing was caused by favorable random mutations that had been promoted by natural selection.

It would therefore be necessary to track changes in the gene pool of the organisms as time progressed. Scientists could do this by taking periodic blood samples. It is easy to imagine a scheme that would work. One scheme would be to simply have a system whereby animals were periodically checked for a collar. If the collar was not found, the animal would be captured, collared, and a blood sample would be taken. By making periodic checks for animals that were not collared, and gaining DNA samples from such animals, the scientists would have up-to-date information on the current gene pool of the animal study groups in each of the different habitats.

It would also be necessary to keep track of the number of offspring of each of the mammals under scrutiny. This would be to test the Darwinian idea that novel improvements spread in a population because they improve the survival rate or reproduction rate of

particular organisms. We can imagine a great number of video cameras in our very large laboratory-zoo that might track the reproduction rate of particular mammals, perhaps using numbers printed on their collars. But an easier technique might be to deduce reproduction rates of particular organisms by analyzing blood samples. If you have blood samples of all of the animal population, then it might be possible to figure out who the parents were, using the same type of techniques used to establish human paternity through blood tests. Either way, keeping track of the number of offspring of each of the mammals under scrutiny would probably be quite a headache and hassle.

As long as no new visible biological innovation appeared in any of the animal study groups, the experiment would be considered a failure. But if a new visible biological innovation appeared in one of the animal study groups, it would then be necessary to study how the gene pool of that animal study group had changed. This could theoretically be done by a computer program that would crunch massive amounts of genome data accumulated from all the periodic blood samples. The computer program might be able to pinpoint exactly the DNA mutations that had led to some biological innovation, and how such DNA mutations had spread in the population. So, for example, we might imagine that one particular mutation might occur in some particular year, and that it had taken 200 generations to spread throughout the study group population; and that some other mutation had occurred in some other year, and that it had taken 400 generations to spread throughout the study group population; and so on and so forth until a complete account was made of how the complex biological innovation had appeared.

Nothing like this project has ever been done. Such a project would require very many thousands of years before it had any chance of success. We know that complex biological innovations require the appearance of multiple new proteins. A typical protein in a mammal is specified by a gene consisting of about 25,000 base pairs. But a single random mutation would add or change only one of these base pairs. So how long would this experiment have to be run before there was even, say, 1 chance in 1000 that random mutations would produce the proteins for a new biological innovation? If you answer “pretty much forever,” you're in the right ballpark.

Suppose that after many thousands or millions of years of running such an experiment, a new complex visible biological innovation somehow appeared in the population of mammals under study. Would this be proof that complex visible biological innovations can appear by Darwinian explanations? Not really, because we have been told many times by scientists that something doesn't really count if it was observed only once, and that science is about *replicated* observations and r*eplicated* experiments. So if you got a good result after running such an experiment for 500,000 years, it would then be necessary to spend another 500,000 years or more trying to replicate the positive result.

There are two reasons for believing that this long-term evolution experiment would never succeed. The first is the enormous unlikelihood that random mutations would every produce the proteins necessary for a new biological innovation. A typical protein consists of hundreds of amino acids that have to be arranged in just the right way to achieve a particular functional effect. The chance of such a thing occurring by chance is roughly comparable to the chance of a typing monkey producing an intelligent page of prose specifying how to accomplish some particular objective.

The second reason for believing that this long-term evolution experiment would never succeed is that even if there were to appear the proteins necessary for the new visible biological innovation, such proteins would not be sufficient to explain the new biological innovation. I can give an example. Let us suppose that dogs placed in a desert-like environment for many thousands of years were to evolve some long tube-like appendage capable of sucking small amounts of water from underground. We could not explain that by simply imagining the addition of some proteins to the genome of the organism. There would have to be a complex change in the body plan of the organism.

Is that body plan specified in DNA? No, it isn't. The claim that DNA is a blueprint for an organism is a myth spread largely to prop up Darwinist claims. The truth is that DNA specifies only low-level chemical information such as the amino acids that make up a protein. For example, nowhere in DNA does it specify that humans have one head, two eyes, two ears, two arms, two legs, and ten fingers. DNA does not specify an overall body plan, does not specify the arrangement of parts in an organ system, does not specify the shape of an organ or its arrangement of parts, and does not even specify the shape of a cell or the arrangement of parts in a cell. Where the body plan of an organism comes from is a great unsolved biological mystery. As an article in *The Scientist* told us a few days ago, "Genomes are not a blueprint for anatomy."

Since DNA does not specify the phenotype or body plan of an organism, and does not specify the arrangement of parts in any organ or appendage, we cannot plausibly imagine how a change in DNA caused by a random mutation could produce some new visible biological innovation. This is another reason for thinking that the long-term experiment I have imagined would never succeed.

Regardless of whether it would have a chance of succeeding or not, the fact is that an experiment like the one imagined (using mammals) has never been done. Slightly similar experiments (but less complex) have been done with fruit flies, which have the advantage of having very short lifetimes. The experiments never produced any useful visible biological innovations in fruit flies.

Suppose an experiment like the one imagined were run, and suppose that very many thousands or millions of years later a single visible

biological innovation appeared. Would that prove that Darwinism was the correct explanation for all for the complex functional innovations we see in the biological world? It would not. It would merely prove that *one* visible innovation could be produced in such a way, not that *most* biological innovations had been produced in such a way. Similarly, you might build some big machine that picks up logs from the ground, and then drops them from a height of 10 meters, repeating such a cycle over and over, and stopping only when the fallen logs accidentally form into something like a log cabin. If you ran such a machine for 50 years and finally got the fallen logs to form into something like a log cabin, this would not at all prove that most log cabins are formed from accidentally falling logs.

But there is one glimmer of hope for those hoping that Darwinism may become something well-confirmed. There is a potential technological device that might allow scientists to gather evidence that might confirm claims such as gradualism. There is a potential invention that might allow scientists to take as many complete samples of DNA as they might like, from organisms living in any number of different times in the past. There is a potential device that might allow biologists to make a complete photographic record documenting exactly how the organisms on planet Earth have changed over the eons. This yet-to-be-invented device is what is commonly known as a time travel machine.

Posted by Mark Mahin at 8:14 AM No comments:

Labels: Darwinism, evolution, natural selection

Wednesday, June 17, 2020

To Launch Their Legend, All They Needed Was a Scientist and a Slogan

In the middle of the nineteenth century, many a scientist wished that there was some natural explanation for biological origins, a story that could be told as an alternative to religious explanations. But at that time scientists were in very bad shape in regard to having anything allowing them to get started on such a thing. Nature did not seem to offer any hint of how things like lions and tigers and humans could have naturally originated.

But at that time there was something which was like a gigantic springboard ready to launch some theory of natural biological origins that might have been proposed, ensuring its cultural success. That springboard was the social structure of academia. Just as the social structure of medieval churches served as a huge springboard that helped many a legend go viral (such as legends of the healing powers of saint bones), the social structure of universities and colleges stood ready to make a natural theory of biological origins go viral. Once an idea starts being spread about by the professors at ten or twenty top

universities, the idea has a good chance of eventually infecting the masses, even if the idea is very poorly substantiated. Once a bandwagon effect gets rolling to spread some idea in a process of social contagion, and an academia herd effect comes into play, some flimsy claim can become a societal norm, a speech custom that all compliant students are expected to mouth.

We know which theory of natural biological origins got the launch of academia's springboard: Darwin's theory of evolution. It is interesting to speculate on what would have happened if Darwin had never lived. What story of origins would academia have told in such a case?

There is no reason to suppose that some theory of evolution by natural selection would have become very popular if Darwin had never lived. Nature never does anything to plant in our minds the idea of natural selection, and no one one ever directly observes such a thing in the way we observe hurricanes, rainfall, animal births and other natural phenomena that can be recorded as having happened on a particular day. Unconscious nature does not ever do anything that is actually an act of selection, because selection (also called “choice”) is an act done only by conscious agents. No visible things we can see with our eyes force upon us the idea of natural selection. So if there had been no Darwin, the phrase “natural selection” would probably not have become popular.

But we can speculate about how other ideas of natural biological origins might have arisen in a world in which Darwin had not been born. For example, I can imagine a scientist named Anderson writing a book entitled *On the Origin of Species by Means of Various Complex Factors*. But such a book would probably not have been very successful. It would have lacked one of the two essential ingredients for a theory of natural biological origins to go viral: a scientist and a slogan.

Within the halls of academia there existed a large group of people extremely eager to popularize some theory of natural biological origins as soon as it appeared. We may call these people the yearning-to-say-we-got-this guys. “We got this” is a phrase people say when they think they have something under control or when they think they understand some thing. The yearning-to-say-we-got-this guys included people in academia who hungered for some theory of natural biological origins which would feather their caps and enhance their prestige: a set of professors yearning to crown themselves with glory by positioning themselves as sages who understood the great secret of biological origins. Of course, if you are a professor of biology or a professor of natural history, you will seem like a vastly more impressive person if you can convince people that you understand the deep mystery of the origin of species and the origin of humanity. Some professor saying "I understand how mankind originated" sounds like a far more impressive figure

than some professor humbly saying, "Such a mystery is a hundred miles over my head." The yearning-to-say-we-got-this guys also included many inside and outside of academia who desired some theory of accidental origins that would fit in with their belief in the nonexistence of any power greater than man. An atheist wants a theory of natural biological origins more than a young boy wants a Playstation or Xbox machine under his Christmas tree.

For such people to propel some theory of natural biological origins, all they needed was to start endlessly repeating some statement with the following form:

"The scientist _____ explained that the origin of man and other species occurred because of _____ _____."

What was needed at the end of this statement was some kind of slogan or catchphrase that could be offered to the public as some simple explanation for the natural origin of species such as mankind. It would not have worked for the yearning-to-say-we-got-this guys to start making this claim over and over again:

"*The scientist Anderson explained that the origin of man and other species occurred because of various complex factors.*"

This would not have worked, because "various complex factors" is not a good slogan or catchphrase. So Anderson would never have been put on Darwin's pedestal.

Let's imagine a different possibility. If Darwin had never lived, there might have been a physicist named Dumont who might have written a book called *On the Origin of Species by Means of Stochastic Differentials, Or How Luckier Luck Yielded Mankind*. Impressing us with lots of complicated equations and abstruse mathematics, such a person might have tried to sell the idea that incredibly complex organizations of matter occurred not just because of luck, but because of *luckier luck*, such differences in luck occurring because of "stochastic differentials," a fancy term meaning "differences in luck."

There would have been little substance in such reasoning, because the idea of "luckier luck" doesn't really mean anything more than the idea of luck. But we can imagine that this Dumont might have been placed on the pedestal of Darwin. With such a book, the yearning-to-say-we-got-this guys would have had the two essential things they needed to launch the legend that the origin of species had been explained: a scientist and a slogan. It is all too easy to imagine a situation arising in which people in academia would have begun endlessly repeating statements like this:

"*Professors agree that the origin of mankind and other species were all explained by the scientist Dumont, who had the*

brilliant insight that such things arose merely because of luckier luck, the type of luckier luck that comes with stochastic differentials."

We can also easily imagine that the dense mathematics of Dumont's book would be frequently cited as "mathematical proof" that mankind had arisen purely because of "luckier luck."

Let's imagine a different possibility. If Darwin had never lived, there might have been a chemist named Evert who might have written a book called *On the Origin of Species by Means of Advantageous Adhesion, Or How Constructive Clumping Yielded Mankind*. Impressing us with knowledge of chemistry and chemical bonds, such a person might have tried to sell the idea that incredibly complex organizations of matter occurred merely because of things clumping together, or adhesion (a fancy term that simply means things sticking together).

There would have been little substance in such reasoning, because the idea of "advantageous adhesion" or "constructive clumping" doesn't really mean anything more than the idea of lucky stickiness. But we can imagine that this Evert might have been placed on the pedestal of Darwin. With such a book, the yearning-to-say-we-got-this guys would have had the two essential things they needed to launch the legend that the origin of species had been explained: a scientist and a slogan. It is all too easy to imagine a situation arising in which people in academia would have started to endlessly repeat statements like this:

"*People used to think that maybe there was design involved in living things. But then the scientist Evert naturally explained the origin of animal species and mankind, with his brilliant insight that such things arose merely because of advantageous adhesion and constructive clumping.*"

But no such alternate histories happened. There was no such Dumont or Evert who got their ideas launched from the huge springboard that is academia. It was Charles Darwin whose ideas went viral because of the huge academia springboard of the yearning-to-say-we-got-this guys. In some ways Darwin was an unsuitable candidate for such treatment. Unlike the Dumont I imagined, Darwin had very little interest or ability in mathematics, meaning he was entirely unqualified to be judging that things of vast mathematical improbability had occurred. Unlike the Evert I imagined, Darwin seemed to have very little interest in chemistry or knowledge of chemistry, making his musings rather laughable as explanations for the vast intricacy and enormous functional complexity of the fine-tuned biochemistry in living organisms, complexity almost totally unknown to anyone in Darwin's time. You can see a little bit of such complexity here.

While it would not have been literally inaccurate or misleading to have used a slogan of “luckier luck” or “advantageous adhesion,” it was literally inaccurate and misleading to have used a slogan of “natural selection.” For selection (also called "choice") is something only done by conscious agents, and Darwin did not at all believe that nature literally selects things, or that nature is conscious. Darwin confessed in 1859 that "in the literal sense of the word, no doubt, natural selection is a false term." Also, the idea of trying to explain incredibly fine-tuned and enormously organized arrangements of matter in organisms by referring to “natural selection” made no sense, because this “natural selection” was a mere filter effect rather than an organization effect or a creative effect. As the leading botanist Hugo de Vries stated:

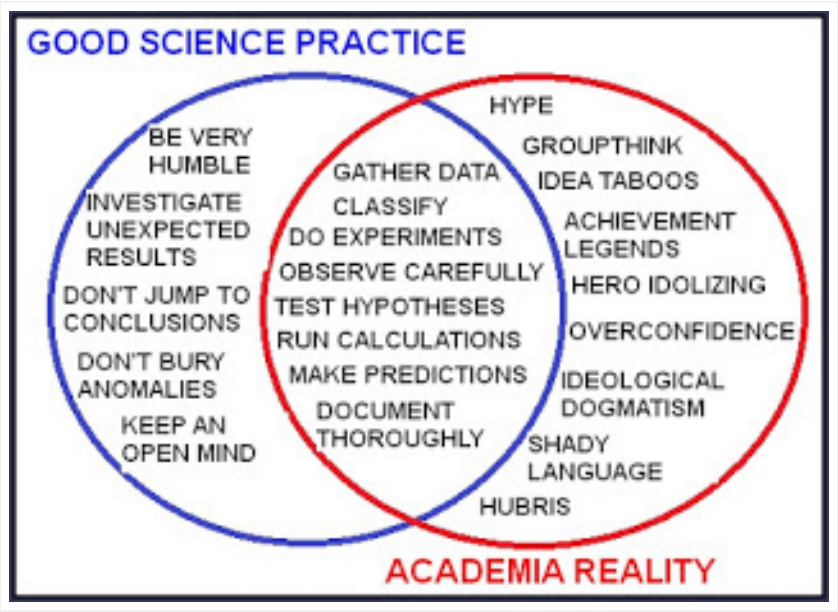
"Natural selection is a sieve. It creates nothing, as is so often assumed; it only sifts."

In his books that consisted largely of armchair reasoning, Darwin produced no evidence or data that anything had originated by his cherished notion of "natural selection." Darwin's attempt at an explanation for the origin of living things was extremely inadequate, but it sometimes happens in life that extremely inadequate work is good enough. And so it was with Darwin's attempt to provide a natural explanation for the origin of living things. Once his books were published, the yearning-to-say-we-got-this guys had the only two things they needed to launch a legend: a scientist and a slogan.

Although it was both misleading and of very little value from an explanatory standpoint, the slogan “natural selection” had the all-important virtue of being an infectious catchphrase. And so the viral particles of Darwinism were propelled forward by the vast springboard and legend-propagation-engine that is academia. Darwin was put on the Darwin pedestal, and the yearning-to-say-we-got-this guys got busy spreading the achievement legend that biological origins had been naturally explained. The yearning-to-crown-themselves-with-glory professors did just that, by selling themselves as people who had mastered the supreme question of biology.

The bandwagon effect got rolling in a process of social contagion which reached its climax when belief in the achievement legend became a required academia norm, a sacred article of faith that could be defied only by those willing to be scorned as heretics. After the achievement legend became a compulsory tenet of academia's belief community, a mandatory shibboleth in a conformist catechism, the yearning-to-say-we-got-this guys had something that sways the millions just as well as good evidence: a huge echo chamber in which the slogan could be chiseled into the minds of the masses by endless

repetition. In the Soviet Union a rather similar sociocultural engine of triumphalist narration sold through endless repetition the achievement legend that Vladimir Lenin had established a worker's paradise, a legend that persisted for more than half a century.



Posted by Mark Mahin at 6:53 AM No comments:

Labels: Darwinism, evolution, origin of biological complexity, sociology of science

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Thursday, April 30, 2020

When Biologists Use Verbs and Nouns in Misleading Ways

The many biologists working to protect us from viral threats deserve our thanks and praise. But while the hands of biologists are often very useful, it seems that the pens and tongues of biologists sometimes err. Let us look at some of the cases in which mainstream biologists used verbs, nouns and adjectives in misleading ways.

The world is full of astonishingly fine-tuned organisms having mountainous degrees of organization and functional coherence. But the typical biologist maintains that all this appearance of design and purpose is just a collection of a million illusions, and that fine-tuned biological organisms appeared merely because of what they call "natural selection." Such a claim seems odd when we consider that what is called "natural selection" never occurs in regard to a biological innovation until after that innovation appears -- and you don't explain something by referring to something that happened after that thing appeared.

Presumably the term “natural selection” refers to something that sometimes occurs in the world: the fact that sometimes fit organisms survive longer and reproduce more. We do not at all know whether "fit organisms" (in the sense of more complex and sophisticated organisms) generally tend to reproduce more than less fit organisms defined in such a way. Lowly bacteria reproduce a lot more often than complex mammals, which casts doubt on whether it is generally true that fit organisms reproduce more. Is the phrase “natural selection” an honest phrase to refer to a superior reproduction rate that more fit organisms sometimes have, or is this phrase a misleading term to refer to that thing?

A simple and strong case can be made that the term “natural selection” is a misleading term that has no business being used in exact scientific discourse. The case can be based on the fact that strictly speaking, unconscious nature does not select things. Selection is something only done by conscious agents that make choices, and nature does no such thing. Strictly speaking, unconscious nature never chooses and never selects.

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► August (8)
► July (8)
► June (8)
► May (8)
► April (8)
► March (9)

Someone may object to the previous reasoning along these lines: “We must continue to use the term 'natural selection' so that we can have a convenient term for the fact that fit organisms reproduce more.” But such a rejoinder is not compelling, because there are two existing phrases other than “natural selection” for the claim that fit things reproduce more. The first is the phrase “differential reproduction.” The second is the phrase “survival of the fittest,” which has long been used in an evolutionary context. So there is no need for the not-literally-correct term “natural selection,” when there are two other literally accurate phrases that express the same idea.

Let us imagine a man living in northern Canada, a man with a very dark and misanthropic attitude towards the fellow residents of his town. He tells his son that the people in his town are all bad people. But let us suppose that the man repeatedly wakes up to find that after a night of heavy snowfall depositing many inches of snow, the 10-meter stretch of sidewalk in front of his house has been shoveled. This would be an observation inconsistent with the man's opinions, for it would suggest some unseen benevolent power working for his benefit.

The man might come up with a hypothesis to try to reconcile such an observation with his dark view of his fellow man. He might claim that his front sidewalk only *appeared* to be shoveled, and that the effect was simply caused by a snowdrift differential: a random difference in the height of snow drifts. We can imagine the man trying this explanation on his son.

Son: Dad, look outside, it snowed all night, but our front sidewalk is all shoveled! Someone out there must like us.
Dad: No, son, that's just an example of what I call a snowdrift differential.
Son: Uh, okay, Dad … if you say so.

The son would be unlikely to believe this explanation, particularly if he woke up repeatedly to see his front sidewalk cleared after a night of heavy snowfall. But if the father wanted to sell his hypothesis in a misleading way, he might come up with a deceptive term to describe

- February (7)
- January (8)

- 2019 (95)
- 2018 (93)
- 2017 (92)
- 2016 (92)
- 2015 (97)
- 2014 (163)
- 2013 (166)

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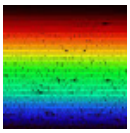
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it: the term “natural shoveling.” The father might say that wind blasts can create a digging effect that mimics shoveling, and he might call this “natural shoveling.”

We can imagine the man using this phrase on his son, and the result would probably be more successful.

Son: Dad, look outside, it snowed all night, but our front sidewalk is all shoveled! Someone out there must like us.
Dad: No, son, this is just another example of what I previously described, the effect I call “natural shoveling.”
Son: Okay, I'm sold. I guess if nature can shovel things, then our front sidewalk can get shoveled by nature.

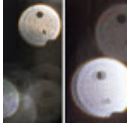
By using this phrase “natural shoveling,” the father would probably be more successful in selling his very far-fetched idea of a natural removal of the snow piling up on his front sidewalk in the middle of a northern Canadian winter. But it would be misleading for him to use this phrase “natural shoveling,” for the simple reason that nature doesn't shovel things. Only people shovel things. A shovel is a tool used only by a human.

The biologist who uses the term “natural selection” is using language as misleading as the “natural shoveling” language used by the father in this example. Just as it is misleading to talk about “natural shoveling,” for the reason that nature never uses a shovel, it is misleading to use the phrase “natural selection,” for the reason that unconscious nature does not select things. Only living or conscious beings (or computer programs) select things.

I may note that there are several reasons why the father in this case is quite similar to the biologist evoking “natural selection” to try to explain away the fine-tuning in biological organisms. Specifically:

1. In both cases we have an interpretation of an observational result that is being driven or motivated by a preconceived opinion (in the father's case, that the people in his town are all bad, and in the biologist's case, that nature must be purposeless and that there cannot be some unobserved designer acting for our benefit).
2. In both cases an inadequate idea is introduced to explain away a result strongly resembling the product of design or intentional action.
3. In both cases, a misleading term is used to sell such a hypothesis more forcefully, “natural shoveling” being a less accurate but more forceful term than “snowdrift differentials,” and “natural selection” being a less accurate but more forceful term than “differential reproduction” or "survival of the fittest."

Observational reality	The biological world is full of organisms	A man in a snowy



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	with mountainous levels of organization and a host of fine-tuned features, resembling the products of design	climate repeatedly observes that his front sidewalk is mysteriously cleared of snow after a heavy snowfall
Type of person who might be irritated by the observational reality	Someone wishing to believe that mankind and other species are merely the product of blind, accidental forces	A grumpy man who thinks all the people in his town are bad, and who doesn't want to believe one of them is nice enough to be repeatedly shoveling his front sidewalk
Phrase such a person might use to try to explain away the observational reality	“Natural selection”	“Natural shoveling”
Is it misleading to be using this phrase?	Yes, because unconscious nature doesn't select things; only conscious agents (or computer programs written by conscious agents) select things	Yes, because nature doesn't use shovels
What honest phrase might express a similar idea?	Reproduction rate differentials, survival-of-the-fittest	Snowdrift differentials

Precision is a key part of good science. A good scientist uses precise and strictly accurate terms, not terms apt to create wrong impressions. Imagine if some scientist were to be frequently referring to “black inferiority,” and were to try to justify this language use by saying that blacks do actually have an economically inferior position in American

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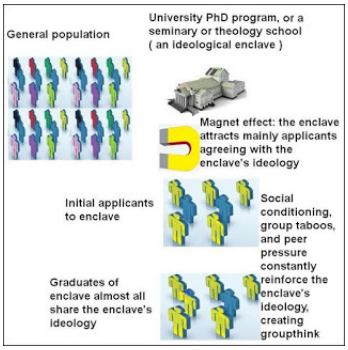

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society. This “black inferiority” phrase would be a bad case of misleading phraseology, since the phrase “black inferiority” is liable to give someone the incorrect idea that blacks are morally or intellectually inferior. Just as we should scold the scientist using so misleading a phrase as “black inferiority,” we should scold the scientist using so misleading a phrase as “natural selection,” creating the incorrect impression that blind nature selects designs. If you want to refer to the lower economic status of blacks in America, use a precise phrase such as “black economic disadvantage”; and if you want to refer to the alleged superior reproduction rate of fitter organisms, use a precise phrase such as “survival of the fittest” or “differential reproduction,” rather than a phrase suggesting nature can do something (choosing) that only conscious beings can do.

The fact that "natural selection" does not actually describe a choice or selection is why Charles Darwin wrote in 1869, "In the literal sense of the word, no doubt, natural selection is a false term." So what on earth is such a "false term" doing at the center of biologists' speech about biological origins?

The Stanford Encyclopedia of Philosophy says this about Alfred Russel Wallace, the co-founder of the theory of evolution: "Alfred Russel Wallace regularly urged Darwin to jettison the term ‘selection’ as misleadingly anthropomorphic, and substitute Herbert Spencer’s ‘survival of the fittest.' " Note well the word "misleadingly" in that sentence. In the same article in that source, we read the following: "In the 1970s a number of biologists working in the fields of paleontology and systematics challenged the Neo-Darwinian dogma that you could account for ‘macro-evolution’ by means of long term extrapolation from micro-evolution."

The misleading phrase "natural selection" is only one example of the many ways in which mainstream biologists use verbs in misleading ways. Another extremely common example is that such biologists frequently make very inappropriate use of mindful-sounding actions words such as "control" and "regulate" and "coordinate" and "drive" when referring to mindless low-level chemical and physical factors, when they should be using much humbler words such as "affect" and "influence" and "limit."

An example is the widespread use of the very inappropriate phrase "gene regulatory network." The term "regulate" means to control something. Because they are mindless low-level chemicals, genes do not control or regulate anything. Instead, genes merely influence and affect various aspects of human biology.

Suggesting that biologists are using language inappropriately, the biologist Denis Noble has stated, "The language of neo-Darwinism and 20th century biology reflects highly reductionist

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

philosophical and scientific viewpoints, the concepts of which are not required by the scientific discoveries themselves." The quote below in a biologist's essay suggests that there is a massive problem of biologists using verbs in an inappropriate way when describing genes:

"In scientific, as well as popular descriptions today, genes 'act,' 'behave,' 'direct,' 'control,' 'design,' 'influence,' have 'effects,' are "responsible for,' are 'selfish,' and so on, as if minds of their own with designs and intentions. But at the same time, a counter-narrative is building, not from the media but from inside science itself."

Similar nonsense is spouted by biologists who attempt to attribute the embryonic development of a human being to mechanical or physical forces. Below is some misleading language on a page selling something called "mechanobiology":

- "In the earliest stages of development, when the tissues are still taking shape, the physical properties of the microenvironment can direct cell differentiation, and initiate the coordinated movement of groups of cells to establish the patterns that will define how the body is arranged." This is baloney. The verbs "direct", "initiate" and "establish" here are utterly inappropriate. The mystery of how generic stem cells differentiate to become one of 200 types of human cells is a profound unanswered mystery of biology. We know of nothing in some "physical properties of the microenvironment" that can explain any such differentiation. As "physical properties of the microenvironment" would be a mindless thing not even storing instructional information, they would have no capability to "direct," "initiate" or establish the vast organizational arrangements needed to form specific cell types. It is all the more ludicrous to suggest that some "physical properties of the microenvironment" have some magical ability to "establish the patterns that will define how the body is arranged," an organization feat more complex than building a skyscraper (since the overall complexity of a human body is vastly greater than a skyscraper).
- "In multicellular organisms, the developmental programs originating within a small group of cells are coordinated across entire tissues or organs through mechanical connections between neighboring cells." We do not know of any developmental programs that can explain the progression of a human being from a fertilized egg to a large baby. The often-made claim that DNA stores such a program (or recipe or blueprint) is false, and DNA only stores low-level chemical information. If such a fantastically complex program existed, it would be inappropriate to claim

- car culture (1)
- cells (4)
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- China (2)
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- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

that it is "coordinated" by "mechanical connections between neighboring cells." At best we should say that development was influenced by such connections.

- "Mechanical signals arising from the ECM directly regulate cellular functions such as proliferation, differentiation, and survival." More baloney. "Mechanical signals" would be mindless things lacking in information, and would not have any power to regulate anything. The simple word "differentiation" in this case refers to miracles of organization (the appearance of 200 types of human cells, many being super-complex arrangements of matter that make an automobile look very simple in comparison). Such miracles of organization could not be "regulated" by mere "mechanical signals."

The mystery of how a human is able to progress from the speck-like simplicity of a tiny fertilized egg to become a large walking talking individual is a mystery 100 miles over the heads of our biologists. Mainstream biologists have always used the same silly trick to try to fool us into thinking they have some understanding of such a miracle of organization. Their trick is simply to take some microscopic thing (whether it be DNA or "mechanical force" or "the microenvironment") and to misleadingly use all kinds of action verbs in relation to such things, telling us that this or that microscopic thing "controls" or "regulates" or "coordinates" or "drives" this or that wonder of biological organization. Such biologists do not justify their use of such verbs, which are profoundly misleading. We know of nothing in such microscopic things that should cause us to be using such mindful-sounding words about them.

Then we have the very frequent inaccurate claims that certain brain regions "light up" during particular mental activities, which is not at all correct. Brain regions basically do not look any different when you think or imagine or remember. The difference in signal strength under fMRI scans is typically less than 1% from one brain region to another during different types of mental activity, except for sensory cortex regions that are more actively involved when sensory activity occurs. Such a difference is about what we would expect from random variations, like the small random variations in temperature between different organs or different parts of an organ. What happens is that neuroscientists make diagrams in which they make it look like some brain region was far more involved than some other region during some mental activity (such as representing in bright red a brain region with a less than 1% difference in signal strength), a misleading technique I have called "lying with colors."

Besides using verbs in such misleading ways, biologists sometimes use nouns and adjectives in misleading ways. A chief example is utterly misleading sentences in which genomes or DNA are called a blueprint for the human body or a recipe for the human body. Neither genomes nor genes nor DNA are any such thing. DNA merely contains low-level chemical information, such as the information on how to make a chemical sequence called a polypeptide chain. As

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

explained here and here, there is no specification in DNA or genomes or genes of how to make a human body or any organ of the body, nor do such things even have a specification of how to make any of the 200 types of cells in the human body.

"DNA cannot be seen as the 'blueprint' for life," says Antony Jose, associate professor of cell biology and molecular genetics at the University of Maryland, who says. "It is at best an overlapping and potentially scrambled list of ingredients that is used differently by different cells at different times." That's the latest of a dozen similar quotes by biologists I have collected in this post. But I could easily make a list three times greater of biologists who have made gigantically false claims that DNA is a blueprint or recipe for making a human. The person who tells you such a lie has misled you in a way far worse than the person who tells you that your father is someone you never met. You will not be pointed in the wrong philosophical direction if you are deluded into thinking your father was someone you never met, but you will be pointed in the wrong philosophical direction if you think you arose from a reading of a blueprint of your body stored in DNA.

Then there are frequent claims by biologists that brains are "hard-wired" for particular behavior. Hard-wiring is an electronics term referring to an inalterable programming. No one has discovered any type of programming in the human brain. No complex mental behavior is hard-wired in the human brain. The term hard-wiring refers to something like the wiring in an old-fashioned TV which guaranteed that a particular movement of the dial would switch the TV to a particular channel. There is nothing in the brain that guarantees any particular complex behavior or particular complex mental states given some particular input or stimulus.

When discussing fossils, biologists are fond of using the term "series" to refer to some set of fossils they may list to suggest some idea. Almost always, the "series" referred to is no such thing at all. Typically the supposed "series" will be some list of fossils cherry-picked from countless thousands of fossils spanning a range of millions of years, and gathered from scattered locations across the world. A series is a set of things coming one after the other, such as the baseball games in the World Series.

Our biologists may also use the term "cousin" to refer to morphologically different organisms, perhaps organisms believed to have a common ancestor millions of years ago. Such language is misleading. Your cousin of the same gender is someone with the same body plan as yours, roughly the same mental capabilities, and a recent common ancestor (you having a grandfather in common). It is misleading indeed to be using the word "cousin" to refer to organisms with very different body plans and vastly different mental capabilities believed to have a common ancestor only in the very distant past. But doing something such as calling chimps and humans "cousins" is only one of a host of gigantically misleading statements biologists have

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

sometimes made trying to persuade you (for ideological reasons) that "you're just an animal" or that "animals are just like you." A man who believes such absurd ideas may be more likely to kill someone, thinking "he's just an animal" as he pulls the trigger.

A very common use of misleading language by biologists is to use the word "human" in reference to pre-human species that were not actually human. For example, a recent press account uses the term "extinct human species" in refering to *Homo erectus*, a species which was not at all human. The use of *Homo* in a species name is no justification for such a thing, such a thing being merely an arbitrary designation applied by scientists. A species that did not use language and did not use symbols and did not make buildings cannot reasonably be referred to as "human."

Biologists may also use the term "ancestor" in a misleading way. This week the web site of Smithsonian Magazine had an article referring to *Homo naledi*, a tiny-brained species dating from about 250,000 years ago. The discussion of a *Homo naledi* is preceded with a section header saying, "Meet our new ancestors." But *Homo naledi* had a brain size less than half the size of the human brain, along with some characteristics of organisms from two million years ago. So *Homo naledi* could not possibly have been an ancestor of humans.

Biologists have also countless times over the past 70 years made an improper use of the term "building blocks of life." The building blocks of organisms are cells, and the building blocks of such cells are proteins. But innumerable times low-level chemicals such as amino acids have been called "building blocks of life" in biological literature, even though such things are merely the building blocks of the building blocks (proteins) of the building blocks (cells) of organisms. In today's science news I see that some nitrogen-bearing compounds that are unrelated to living things (and not components of any living thing) are being called "building blocks of life," which is a particularly egregious abuse of such a term.

Neuroscientists are guilty of very misleading language when they attempt to explain human memories (which can last for fifty years) by appealing to what they call "long-term potentiation." So called "long-term potentiation" is actually a very short-term effect. Referring to so-called "long-term potentiation" with the acronym LTP, a scientific paper tells us, "In general LTP decays back to baseline within a few hours." "Decays back to baseline" here means the same as "vanishes."

It would seem that because of ideological motivations quite a few of our biologists are sometimes unreliable and careless in their speech, so unreliable and careless that we should subject all of the pronouncements of biologists to careful critical scrutiny, the same critical scrutiny we should apply to the words of politicians.

Posted by Mark Mahin at 8:05 AM No comments:

Labels: Darwinism, evolution, natural selection

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

Thursday, March 19, 2020

His "Deep History" Does Not Sound Very Deep

Scientist Joseph LeDoux has authored a recent book entitled *The Deep History of Ourselves: The Four-Billion-Year Story of How We Got Conscious Brains.* I think the title is rather inappropriate, because what LeDoux presents isn't really history and isn't very deep.

The reason why a book such as LeDoux's isn't really history is that it is so largely speculative. History is a narrative of recorded events derived from observations of such events. But when scientists fill up books with doubtful speculations about things such as the origin of life, the origin of eukaryotic cells, the origin of multi-cellular life, the origin of sex, the origin of language and the origin of mind – all events never observed by humans – they are not really doing any such thing as giving us a history. They are instead merely giving us a speculative narrative. Until someone invents a time machine allowing observations of the past, or gets a record of historical observations of Earth made long ago by extraterrestrials, or until human science advances vastly beyond its current limits, no one can credibly claim to write a matter-of-fact history of life on our planet (unless he is merely listing when this or that species appeared, based on fossils).

From an explanatory standpoint, there is nothing very deep about what LeDoux provides. His explanations are based on two ideas: Darwinism and the idea that human mental phenomena are explained purely by brains. Neither of these ideas is deep. There are very deep theories in modern science, including the very deep and hard-to-explain ideas of general relativity and quantum mechanics. But Darwinism is a shallow notion that is so simple it could be written on the palm of your hand. Darwinism is basically the idea that incredibly lucky random things sometimes happen, and that such luck piles up, to become all of the wonders of biology. You would have no trouble stating the bulk of such an idea as a fortune-cookie message, which would look kind of like this:

As for the idea that human mental phenomena are explained purely by brains, there is nothing deep in such an idea. Below are two answers, neither of which involve any terribly deep thinking.

Little girl: Jimmy, who made the sun? And who made the tall buildings? And who made the cars? And who made the clouds?

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

Little boy: The answers are simple. They are: Santa Claus, Santa Claus, Santa Claus and Santa Claus.

Philosopher: From whence comes that hint of the transcendent we feel when we look at a sky ablaze with stars? From where do our loftiest ethical principles arise? Why do we lie awake at night and ponder the weightiest riddles of existence? How do we ever grasp the most abstract notions such as the idea of the universe and the eternal laws of nature?
Neuroscientist: The answers are simple. They are: neurons, neurons, neurons, and neurons.

I'll give some reasons why I don't think there's much depth in LeDoux's discussion of how we got our minds. Consider the question of human memory. There are three main things that would need to be explained by any neural theory of human memory:

- **Storage:** How it is that humans could ever store a memory for decades, or even for a single year, in a brain where proteins have an average lifetime of only a few weeks.
- **Encoding:** How is it that human knowledge (such as conceptual information or episodic memories) could ever be translated into neuron states or synapse states.
- **Retrieval:** How is it that a human could ever instantly retrieve a memory, such as we see happening when someone speaks a name, and you instantly remember many different facts about that person.

Looking at the index of LeDoux's book, I see quite a few entries under "memory," but I see no entries for memory storage, memory encoding or memory retrieval. And I see no entries under "storage," "retrieval" or "encoding." LeDoux seems to have not given any substantive explanation for the three items in my bullet list above. Our bodies show mountainous heights of organization and complexity, but in the index of LeDoux's book I see no entries for "organization" or "order" or "complexity." So his claim to have a "deep history of ourselves" seems rather suspect.

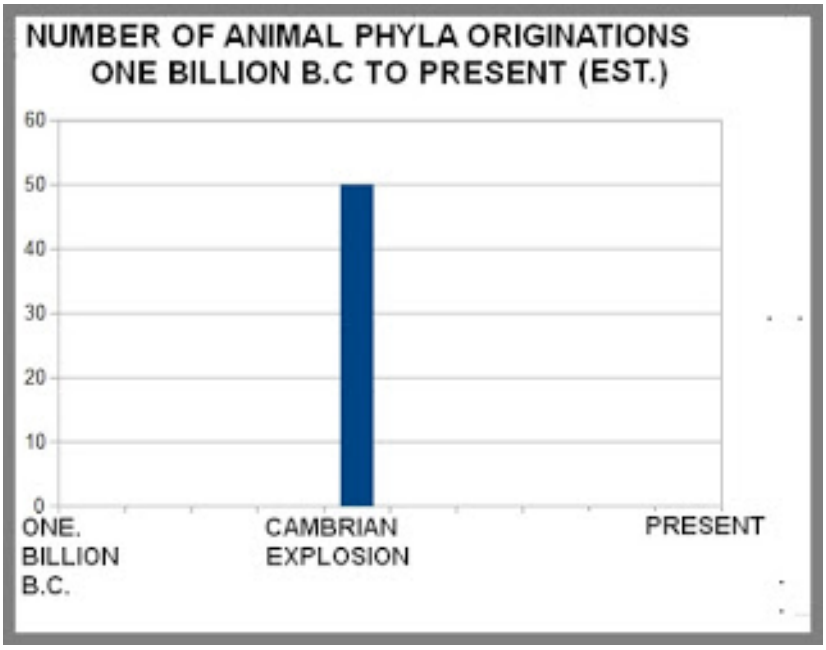
There are many diagrams in the book, and some of them are objectionable. Some examples:

- On page 58 we have a diagram showing the glass apparatus of the Miller-Urey experiment, and it has the very untrue caption "Miller and Urey's Experiment to Create Life in the Lab," which probably leaves some readers with the idea that life was created in a lab. The Miller and Urey experiment created neither life in the lab nor the building blocks of life (proteins), nor was it either an attempt to create life in the lab, nor an attempt to create proteins in the lab. The experiment was merely an attempt to create amino acids, which are the building blocks of the building blocks of life.

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

- On page 69 we have a diagram comparing a prokaryotic cell and a eukaryotic cell. The diagram (looking like a child's sketch) makes a eukaryotic cell look maybe 100 or 1000 times simpler than it is, and makes it look as if a eukaryotic cell is maybe twice as complicated as a prokaryotic cell. Although the complexity of a eukaryotic cell is almost impossible to properly depict in a diagram, there are diagrams that properly convey the idea that eukaryotic cells are very many times more complex than prokaryotic cells, such as the one we see on this page.
- On page 72 we have a diagram depicting a "tall tale" theory of the origin of eukaryotic cells, a theory that we got these cells 100 times more complex than prokaryotic cells through mere acts of ingestion.
- On page 163 we have an implausible-looking graph claiming that jaws evolved from gills. The visuals fail to show any structural similarity between the two. Since DNA does not specify either cell types or visible structures such as jaws or gills, we do not have any credible theory of how gills could have evolved into jaws by random mutation changes in DNA, nor do we have any credible theory of how any one complex visible structure could have evolved into any other very different visible structure because of mutations in DNA.
- Throughout the book are "family tree" ancestry diagrams that are not historical, but merely speculative.
- On page 303 we have a "regions of the brain" diagram which makes many unproven assertions, such as claims that particular mental facilities comes from particular tiny parts of the brain. It rather reminds you of one of those phrenology charts that used to be popular, like this one.
- On page 113 we have a visual marked "Cambrian Explosion." But it merely looks like some animals in an aquarium tank, which tells us almost nothing. A proper diagram shedding light on the Cambrian Explosion would be a "phylum origination" chart graphing the origin of animal phyla over the past billion years, and showing that the animal phyla all originated in one burst during the Cambrian Era. The diagram would look like the one below.

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)



LeDoux's explanation for this explosion of so many different types of enormously organized body plans is that a worm diversified (page 113), which I don't regard as a very deep explanation, particularly when I consider the vast number of new proteins needed for the origination of such phyla, each such protein being a very complex invention incredibly unlikely to arise from random mutations.
But LeDoux's readers may not have such reservations, as they are never given any explanation of the complexity of proteins, and are never told things such as that most proteins require a very special arrangement of hundreds of amino acids to achieve a functional end, like hundreds of well-arranged characters in a computer software subroutine.

LeDoux avoids discussing the vast organizational complexities of biological life, perhaps because such a discussion might clash with his story line. Not just in the diagrams but also in the text the author sometimes rather seems to portray life as being very much simpler than it is. On page 95 he very strangely claims "there are only three forms of complex life." On page 59 he makes it sound rather as if DNA required only a single gene. He states, "DNA is believed to have emerged through a transformation of RNA, possibly by a virus that converted an RNA gene into a DNA gene." To the contrary, the simplest self-reproducing cell would have required DNA with at least 100 genes, and probably many more. A team of 9 scientists wrote a scientific paper entitled, "Essential genes of a minimal bacterium." It analyzed a type of bacteria (*Mycoplasma genitalium)* that has "the smallest genome of any organism that can be grown in pure culture." According to wikipedia's article, this bacteria has 525 genes consisting of 580,070 base pairs. The paper concluded that 382 of this bacteria's protein-coding genes (72 percent) are essential.

We have on page 22 a diagram that teaches the unproven dogma that humans and chimps have a common ancestor, but the diagram does not specify what such an ancestor was, just as it does not identify six other points in the ancestry tree

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

depicted. How can we have confidence in such a diagram when so many of its nodes are unspecified? Such diagrams depicting "trees of human ancestry" seem to be getting more and more vague as time goes on.

In Chapter 47 LeDoux discusses the origin of language, but says nothing to suggest he has any deep understanding on this supremely perplexing problem. He mainly just mentions various thinkers' fragmentary thoughts on such topic, such as saying that "Michael Corballis...proposed that language evolved because it allowed communication about internal states to others," and that a pair of other people suggested that "language was cobbled together in early humans by way of synaptic plasticity that coupled together neural mechanisms underlying existing traits, such as nonverbal communication, serial cognition and tool use," which is a big mouthful that doesn't really say much of anything.

No one has ever come up with a credible detailed scenario by which a first human language could have naturally originated. This is one reason that no movie, play or TV show has ever depicted the origin of language. The problem is that you can't create a spoken language and establish a spoken language in a community unless a language already exists, leaving no path for explaining the appearance of a first language. We can imagine some cave men agreeing on some hand gestures, but can imagine no path of progression by which some set of hand gestures would evolve into a rich spoken language with complex rules of grammar.

A real "deep history of ourselves" would have a lengthy discussion of the psychic and paranormal experiences that are so often a part of human experience, but such experiences are usually never mentioned in books such as LeDoux's, probably because the authors wish to exclude human experiences conflicting with their explanatory claims, the types of experiences that are inexplicable as neural effects.

It might be convincing if a book were to present a series of facts forcing on us the idea that thought comes from the prefrontal cortex, and if the author were to then say, "Therefore, based on all of these many facts I have discussed, we are forced to conclude that thought comes from the prefrontal cortex." But instead in LeDoux's book we have these lines (page 248), which sound like dogmatic traditionalism:

"The prefrontal cortex is traditionally viewed as home to the headquarters of cognition. This is undoubtedly the case."

No one should be confident about such a belief tradition after reading the many facts and observations discussed in this post, which mainly conflict with such a belief dogma. For example, the 1966 study here states, "Taken as a whole, the mean I.Q. of 95.55 for the 31 patients with lateralized frontal tumors suggests that neoplasms in either the right or left frontal lobe result in

only slight impairment of intellectual functions as measured by the Wechsler Bellevue test."

When I read the overconfident dogmatism in a book such as this, such as its claims that particular mental functions come from particular little spots of the brain, it reminds me of the erring geographical specificity of Donald Rumsfeld. The USA invaded Iraq in March 2003, ostensibly to capture "weapons of mass destruction" supposedly stockpiled in Iraq. In March 2003 Rumseld was asked by George Stephanopoulos whether it was "curious to you that given how much control U.S. and coalition forces now have in the country, they haven't found any weapons of mass destruction?" Rumsfeld claimed "we know where they are," and that "they're in the area around Tikrit and Baghdad and east, west, south and north somewhat." The claim was bunk, and after the US invasion weapons of mass destruction were never found in Iraq.

Just as the weapons in mass destruction in Iraq were embarrassingly absent to the weapons searchers, memories in brains are embarrassingly absent to the engram searchers. If memories were stored in brains, we would have discovered readable memories that could be read from dead bodies. Just as we discovered around 1950 the genetic code used by microscopic DNA, we would have discovered in the twentieth century proof of some brain code used to store memories, if such a code existed. But no such memories can be read from dead bodies, and no such code has been discovered. We can discover nothing about what an organism has learned from studying its brain. Scientists have not found in the brain anything like a memory-writing component or a memory-reading component, and can find in the human genome none of the memory-encoding proteins that we would expect to exist in very massive numbers if a brain encoded memories into neural states or synapse states. In the places they hoped might be a stable storage place for memories (synapses), neuroscientists have found only instability, short molecular lifetimes and rapid protein turnover. Nor have our neuroscientists ever found anything to explain how a neuron or any group of neurons can think or imagine or have an abstract idea or have anything like self-hood, despite all the decades of lavish funding for neuroscientists.

If we ever discover the cause of the super-complex organization of our bodies (far more impressive than anything humans have ever built), and the cause of our minds and memory (something that can never be produced by the most complex computer technology), and the cause of a progression of a speck-sized egg to become a full-grown human (an effect our technology could never mimic), I suspect it will be explanations about 20,000 leagues deeper than the facile explanations of today's professors.

Posted by Mark Mahin at 8:46 AM No comments:

Labels: Darwinism, evolution, origin of biological complexity, origin of language

Monday, March 9, 2020

Complex Innovations by Random Mutations Are a Googol Times More Improbable Than a Point Improvement

The Darwinist explanation for complex functional biology is that it arose from random mutations and natural selection. We have no evidence that any complex biological innovations ever appeared because of random mutations, natural selection or any combination of the two. Darwinists try to back up their explanation of biological innovations by presenting examples of something that improved through a random mutation. But we must distinguish between two different probabilities:

1. The likelihood of getting an improvement in existing functionality from one or more random mutations (call it Probability 1).
2. The likelihood of getting a new complex innovation from one or more random mutations (call it Probability 2).

The second of these probabilities is almost infinitely more improbable than the first. I can give an example that illustrates the vast difference between these two probabilities.

Let us consider: what is the likelihood that a random change in some functional and almost-perfected written text may improve that text? We can roughly calculate this probability in a fairly straightforward manner, using this formula:

Probability of a random character improving almost-finished text (P) = percentage of characters that are typing errors (X) multiplied by likelihood of a random character being the character that fixes the typing error (Y).

Here is a simple example. Let's imagine you just typed some code for a computer program. There is a certain percentage of these characters that will be typing errors. We can use 1% as a rough estimate for this probability. The probability that a random character will fix the typing error is about equal to 1 divided by the number of possible characters that you can type using a single keystroke. Given that there are about 50 characters you can type using a keyboard, we can roughly estimate this probability as being 2 percent. So under these assumptions, the likelihood that a random keystroke anywhere in your text will improve your recently typed programming code is roughly 1% (.01) multiplied by 2% (.02). That is a likelihood of about .0002. If you were a very careful typist who made only one mistake per 1000 characters, the probability of a random character improving your text would be only .00002. But if you were a rather careless typist who made a mistake in every ten characters typed, the probability of a random character improving your text would be higher, about .002.

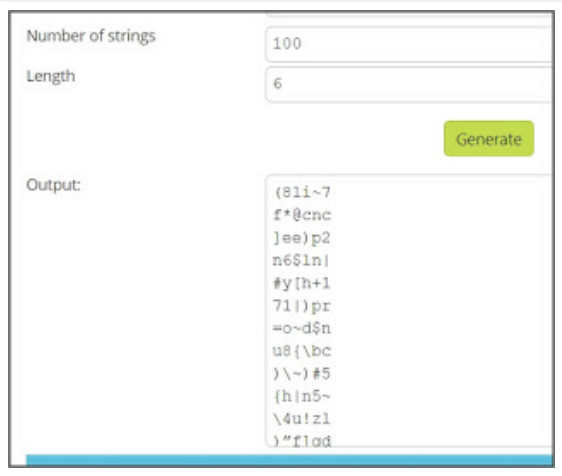
It is clear from this discussion, that it is not vastly improbable that a random mutation will improve some close-to-completed piece of

functionality, given a small error rate in the block of semantic information that codes that functionality. So when we hear about a rare random mutation that might slightly improve an existing biological function, we should not be terribly surprised.

But what about the likelihood of random mutations producing whole new functionality? Then the math is entirely different. To calculate the chance of that, we must estimate the likelihood of you producing a working body of instructions (such as a functional computer program) by just typing random characters on your keyboard, or having some computer program generate completely random characters. It is very hard to do anything like an exact calculation of such a probability. I can calculate the exact number of combinations that could be produced from typing a thousand random characters, but there is no way to precisely calculate what percentage of these would be useful or meaningful instructions.

But there is a way to do a very rough calculation. Consider a block of six characters. Each of those characters can be any of about 50 different things, given 26 possible letters, 10 possible numbers, and about 14 different punctuation marks. That means that there are about fifty to the sixth power possibilities (or 15,625,000,000 possibilities) when you randomly type 6 characters. But the English language has only about 200,000 words, and there may be as many as 100,000 recognizable names such as recognizable last names, first names, and brand names, meaning there are very roughly about 300,000 six-character combinations that might be meaningful. 15,625,000,000 divided by 300,000 is 52,083. That means your chance of typing an English word or recognizable name when you type six random characters is very roughly about 1 in 52,083, which we can round down to be about 1 in 50,000. In this rough simplistic calculation I ignore the fact that most English words are smaller or larger than six characters.

We can do a little reality test on this estimate by using the random string generator at this site. When I use “abcdefghijklmnopqrstuvwxyz0123456789~!@#$%^&*()_+={}|[]\” as the allowed characters, and type 100 under “Number of strings,” and type “6” as the length, I get 100 random strings, none of which are intelligible words or names. When I keep pressing the Generate button 5 or 10 times, I fail to see any intelligible word or name. Although this doesn't prove the previous estimate, it is a result consistent with such an estimate.



Random text generated at this site

Now, in a block of 1000 characters there are 166 six-character blocks. So to make a very rough calculation of the chance of you getting meaningful instructions from 1000 randomly typed characters, one that is greatly oversimplified, it would seem that we should multiply the 1 in 50,000 likelihood discussed above by itself 166 times. This gives you a likelihood which ends up being roughly 1 in 10^{780} or 1 in ten to the seven-hundred-eightieth power. How often should we expect something that unlikely to happen? We should expect that it should never happen in the history of the observable universe.

I may note that the actual chance of getting a useful, meaningful instruction set of 1000 random characters is actually much less than the probability roughly calculated previously. I have merely calculated the chance of getting 1000 random characters that have a very superficial appearance of intelligibility, with all the words being intelligible words. The chance of such words actually making a useful instruction set would be vastly smaller than the microscopic probability just calculated.

So we can see that there is an ocean of difference between the likelihood of a single random mutation producing an improvement in some nearly-complete functional instructions and the likelihood of a complex new functional instruction set arising from random mutations. It is more than a googol times (ten to the hundredth power times) more improbable that a complex new functional instruction set might arise from random mutations than it is that a single random mutation might improve some existing functional instruction set. A googol is ten to the hundredth power.

So when our Darwinist biologists attempt to back up the idea that complex biological innovations arose from random mutations, and they refer us to cases where some tiny gain in function resulted from a single point mutation, they are trying to make us believe in something almost infinitely more improbable than the cases they are providing as evidence. Although proteins are not specified by strings of English characters, the mathematics of getting a functional protein from

a gene that is a random string of thousands of nucleotide base pairs is very much in the same ballpark as the math I have discussed relating to the probability of getting a functional instruction set from 1000 random characters. Each of the more than 20,000 types of protein molecules used by humans is its own complex biological innovation, and a protein is typically specified by its own gene that is a unique sequence of thousands of nucleotide base pairs.

I can give an analogy to illustrate the difference between the likelihood of some random mutation producing a point improvement, and the likelihood of some set of random mutations producing a complex biological innovation. The first likelihood is like the probability of throwing two cards towards a house of cards, and the two cards producing an improvement at one point in the house of cards. The second likelihood is like the chance of you tossing an entire deck of 52 cards into the air, and those cards forming into a house of cards, with most of the cards becoming part of the house of cards. There is obviously no comparison between these two. The first event is something we would expect to see happening maybe once in 50,000 tries. The second event is something we would not expect to occur even once in a million billion trillion quadrillion tries, something we would not expect to see once in the observable universe even if the observable universe was filled with people spending their lives throwing decks of cards into the air.

Realistic math is so very hostile to the explanatory pretensions of our biologists that one scientist last month took the extremely desperate measure of appealing to multiverse speculations to try to back up theories of random biological origins. I'll have a reply to that one day.

Posted by Mark Mahin at 8:35 AM No comments:

Labels: evolution, natural selection

Saturday, February 15, 2020

They Claim to Understand Our Origins, But Don't Even Understand Cell Division

There's a basic principle sometimes evoked in the world of technology. The principle is sometimes expressed by the saying: don't try running until you've learned how to walk. What this expression means is: don't try some very difficult thing until you've first mastered some much simpler thing that should be mastered before you try the harder thing. An example of this in the technology world might be: don't try making a walking man-sized android robot until you've first made a little walking robot the size of a child's toy.

In the technology world, they are pretty good at following the principle of “don't try to run until you've learned how to walk.”

But in the world of theoretical biology, scientists are very bad at following this simple rule of common sense. Again and again, our theoretical biologists do something that is like someone trying to run before he has learned how to walk. For our biology theorists attempt to answer the most difficult problems in biology (and even tell us that they have succeeded in such attempts) before they have answered some of the most simple problems in biology.

One of the most simple problems in biology is the problem of protein folding. Protein molecules have complex three-dimensional shapes. But the genes that make up DNA show no signs of specifying such shapes. A gene merely specifies a linear sequence of amino acids that make up a string-like chain of amino acids called a polypeptide chain. But such chains somehow fold into complex three-dimensional shapes, shapes that are necessary for the proper function of proteins. Why does that occur? Nobody knows.

It is sometimes claimed that the three-dimensional shape of a protein is somehow a consequence of its one-dimensional sequence of amino acids (the amino acids that make up the polypeptide chain). But there is no good evidence that this is true. If such a thing were true, it should be easy for scientists to predict the three-dimensional shape of a protein from its amino acid sequence specified in a gene. But for decades scientists have been failing at *ab initio* attempts to predict the shapes of complex proteins from the amino acid sequences specified in the gene that corresponds to the protein.

Long story short, we simply do not have the answer to the very simple and basic question of how proteins are able to successfully fold into the three-dimensional shapes needed for them to be functional. This is one the most low-level and basic and small-scale questions in biology, and we haven't even answered it yet.

There is another very low-level and basic and small-scale question in biology: why do cells reproduce? Why does a cell split into two to become two cells? Our biologists don't even understand this.

On a web page entitled "The Mystery of Cell Division," a scientist confesses that scientists don't understand how cells -- with a complexity of "airplanes" -- could self-reproduce.

"Scientists have been trying to understand how cells are built since the 1800s. This does not surprise us and, as scientists ourselves, we have always been puzzled at how cells, such complex structures, are able to reproduce over and over again. Even more astonishing is that, despite the frequency of cell division, mistakes are relatively rare and almost always corrected. According to Professor David Morgan from

University of California, the complexity that we observe in cells can be compared to that of airplanes."

If you do a Google search for "why do cells divide," you will get various answers referring to high-level causes. A web site may state that cells divide to replace old, dead or damaged cells, or that cells divide so that an organism can grow, or that cells divide so that an organism can reproduce. But these are all "grand purpose" reasons, and none of them is a low-level reason. What we do not understand is: what cell-level reason is it that cells divide into two? Considering only the cell itself, and not some higher purpose, what would cause a cell to reproduce by splitting into two?

Scientists do not understand such a thing. They have identified particular stages in the most common type of cell reproduction (called mitosis): stages such as prophase, metaphase, anaphase and telophase. But without referring to higher-level "grand purpose" reasons, scientists do not understand why (on the individual cell level) a cell would pass through such phases and reproduce. A university press release confesses, "there are many remaining mysteries about how cells perform this remarkable feat." The answer is not at all "the cells follow the instructions in DNA." DNA does not contain any instructions for making cells or any specification or blueprint of a cell.

An M. Pitkanen (who has a PhD in theoretical physics) has written the following about cell division:

"Replication is one of the deepest mysteries of biology. It is really something totally counterintuitive if cell is seen as a sack of water plus some chemicals. We have a lot [of] facts about what happens in the replication at DNA level but how this miracle happens is a mystery. At cell level the situation gets even more complex."

A university press release discusses scientific ignorance about the basis question of cell division. It states the following:

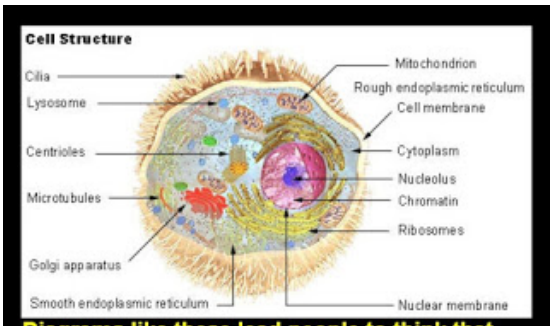
"When a rapidly-growing cell divides into two smaller cells, what triggers the split? Is it the size the growing cell eventually reaches? Or is the real trigger the time period over which the cell keeps growing ever larger?...'How cells control their size and maintain stable size distributions is one of the most fundamental, unsolved problems in biology,' said Suckjoon Jun, an assistant professor of physics and molecular biology at UC San Diego...'Even for the bacterium E. coli, arguably the most extensively studied organism to date, no one has been able to answer this question.' "

The press release claims that some study has "shed light" on this mystery, but the study mentioned doesn't sound very impressive, merely being something that mathematically

analyzed cell growth, and claimed to have found a "principle of cell-size control," without discussing a cause for such a thing.

It would be easy to understand cell reproduction if cells were very simple. Imagine if a cells were just uncomplicated little blobs kind of like little bubbles. Then a cell might be able to reproduce easily enough by a simple collision. When one cell collided with another, it might cause a large cell to break up two smaller cells. But what goes on in cell reproduction is gigantically more complicated than that.

Cells are so complicated that they are sometimes compared to cities, and the organelles in cells (such as the mitochondria, ribosomes and Golgi apparatus) are sometimes compared to buildings in a city. You will vastly underestimate the complexity of a eukaryotic cell (the type of cells in the human body) if you look at one of those cell diagrams that shows only a few organelles in the cell. In some cells there are millions of ribosomes, and thousands of mitochondria. So when a cell reproduces, it's like some complicated machine made an exact copy of itself. Using Morgan's statement that cells are as complex as airplanes, this is as much a wonder as if some airplane were able to make an exact copy of itself.



Diagrams like these lead people to think that eukaryotic cells are 1000 times simpler than they are. Instead of having two mitochondria, there can be hundreds per eukaryotic cell. In a mammal cell, there can be millions of ribosomes.

We have no real understanding of why the marvel of cell reproduction happens. We understand high-level “grand purpose” reasons why such a thing needs to happen, but we have no understanding of low-level molecular factors that would cause a cell to undergo this fantastically complex act of reproduction.

Consider just one small aspect of cell division, an aspect discussed by a university press release : the "century-old mystery" of how cells "package long, tangled strands of chromosomes into tightly compact structures before cell division." The press release has a kind of "mystery finally solved" sound to it, but this is just yet another example of the runaway tendency nowadays for university press releases to claim explanatory achievements that haven't actually been made (something we can see in literally thousands of other

university press releases). The scientific work being heralded merely discusses some speculations about some extremely complex structure that might be used during such a process, a structure consisting of a "helical arrangement of loops." We see a visualization of this very complicated intricate structure supposedly used to achieve only a small fraction of the huge job of cell division. But nothing is mentioned about what could cause a structure so intricate and fine-tuned to arise so quickly during cell division that only takes about two hours. Similarly, almost all press releases in the past twenty years claiming some progress in understanding cell division are mainly hype and exaggeration, the vast majority discussing work dealing with only a tiny fragment of the overall mystery of how cells reproduce.

Even though such a basic low-level biological mystery as cell division cannot be well-explained by our biologists, they ask us to believe that they understand something a million times more complicated: the mystery of how human organisms first originated. A boast so preposterous is rather like a person who doesn't understand what a boat is telling you he understands how to command an aircraft carrier, or a person who doesn't understand what an atom is telling you he knows how the sun keeps shining, or a person who doesn't understand what a war is or a country is telling you he understands the history of the twentieth century.

Posted by Mark Mahin at 9:47 AM No comments:

Labels: biology, cells, evolution, tininess of human knowledge

Friday, January 10, 2020

A Method for Evaluating the Strength of Causal Claims

An elementary school student might think to himself something like the following,

"When scientists figure out the cause of some effect, they start saying that such a cause is the reason why the effect occurs. If they don't know what causes the effect, they just say they don't understand what causes it."

Such a generalization is naive. A more accurate and realistic description is the one below:

Scientists often determine the cause of an effect, and begin to state that cause as the reason why that effect occurs. In many other cases, humans are unable to figure out what the cause of an effect is. But that doesn't stop scientists from making claims about what causes the effect. In many cases such claims are weakly supported by evidence or logic, but scientists continue to make such claims because the assertion of such claims has

become a speech custom of scientists, or because the claims help the scientists avoid or sweep under the rug some possibility they prefer not to believe in.

Given such a situation, it is helpful to have some method for evaluating the strength of causal claims. Using such a system, we might be able to distinguish between strong causal claims and weak causal claims. I can think of such a method, which I list below.

In the method I propose, we ask many different questions, and either add or subtract points based on the answers. Here are the questions:

Y= Effect, X=proposed cause of the effect	
1. Has Y always been observed occurring whenever X occurs?	+1
2. Has Y usually been observed occurring when X occurs?	+1
3. Has Y sometimes been observed occurring when X occurs?	+1
4. Has Y never been observed occurring when X occurs?	-1
5. Does X usually occur without producing Y?	-1
6. Does X sometimes occur without producing Y?	-1
7. Does Y always occur very close in time and space to X?	+1
8. Can we think of some reason why X would always produce Y?	+1
9. Can we think of some reason why X would usually produce Y?	+1
10. Can we think of some reason why X would occasionally produce Y?	+1
11. Can we think of some reason why X would never produce Y?	-1
12. Can we think of some reason why X would usually not produce Y?	-1
13. Are there no other reasonable theories of how Y could be produced other than assuming X produced it?	+1
14. Can we think of a fact or facts that are true, but which are surprising or unexpected if X causes Y?	-1
15. Can we think of some fact or facts that are true, but hard to explain unless X causes Y?	+1
16. If X an undisputed reality that has been instrumentally measured or photographed?	+1

Using this system, we should find that strong causal claims end up with a positive score, and weak causal claims end up with a zero or negative score. The stronger the causal claim, the higher the should be, and the weaker the causal claim, the lower the score should be.

Let's try this system, using a specific example. An example of a causal claim is the claim that water freezing is caused by temperatures below 0 degrees Celsius. Below is how we can compute the score of this causal claim. (For the purpose of simplicity, the only places being considered are the surface of Earth and the surface of the moon.)

Y= Water freezing, X=Temperatures below 0 degrees Celsius		
1. Has Y always been observed occurring whenever X occurs?	0	An arid landscape (such as on the moon) can show no signs of water freezing even when temperatures are below 0 degrees Celsius.
2. Has Y usually been observed occurring when X occurs?	+1	We usually observe freezing at temperatures below 0 degrees Celsius.
3. Has Y sometimes been observed occurring when X occurs?	+1	We usually observe freezing at temperatures below 0 degrees Celsius.
4. Has Y never been observed occurring when X occurs?	0	Water has been observed freezing at emperatures below o degrees Celsius.
5. Does X usually occur without producing Y?	0	Temperatures below 0 degrees Celsius usually do not occur without producing water freezing
6. Does X sometimes occur without producing Y?	-1	Temperatures below 0 degrees Celsius sometimes occur without producing water freezing, in arid places like the moon.
7. Does Y always occur very close in time and space to X?	+1	Water freezing always occurs at the same time and place as temperatures below 0 degrees Celsius.
8. Can we think of some reason why X would always produce Y?	0	We can think of no reason why temperatures below 0 degrees Celsius would always cause water freezing, because on some

		landscapes like the moon there is no water.
9. Can we think of some reason why X would usually produce Y?	+1	We can think of a reason why temperatures below 0 degrees Celsius would usually cause water freezing, given that most places have water that might freeze.
10. Can we think of some reason why X would occasionally produce Y?	+1	We can think of a reason why temperatures below 0 degrees Celsius would sometimes cause water freezing, because most places have water that might freeze.
11. Can we think of some reason why X would never produce Y?	0	There is no reason why temperatures below 0 degrees Celsius should never produce water freezing.
12. Can we think of some reason why X would usually not produce Y?	0	Given that most places have water, there is no reason why temperatures below 0 degrees Celsius should usually not produce water freezing.
13. Are there no other reasonable theories of how Y could be produced other than assuming X produced it?	+1	No one has advanced an alternate theory of how water freezing could occur other than temperatures below 0 degrees Celsius.
14. Can we think of a fact or facts that are true, but which are surprising or unexpected if X causes Y?	0	No, we can't.
15. Can we think of some fact or facts that are true, but hard to explain unless X causes Y?	+1	Frozen water (ice) is very cold, and we would not expect it to be so cold unless temperatures below 0 degrees Celsius had caused it get so cold.
16. If X an undisputed reality that has been instrumentally measured or photographed?	+1	No one disputes that there are temperatures below 0, and such temperatures have been instrumentally measured with a thermometer.

So using this scoring system and adding up all the numbers, it turns out that the claim that water freezing is caused by temperatures below 0 degrees Celsius ends up with a score of +7. In this case, the system seems to work well. We have a very strong cause and effect relation in this case, and the causal explanation has scored highly using our system.

Let's try this system, using another specific example. An example of a causal claim is the claim that thunder is caused by lightning. Below is how we can compute the score of this causal claim.

Y= Thunder, X=Lightning		
1. Has Y always been observed occurring whenever X occurs?	0	While thunder is believed to occur whenever lightning occurs, we sometimes hear no thunder when we see lightning.
2. Has Y usually been observed occurring when X occurs?	+1	We usually do hear thunder when lightning occurs.
3. Has Y sometimes been observed occurring when X occurs?	+1	We usually do hear thunder when lightning occurs.
4. Has Y never been observed occurring when X occurs?	0	Thunder does occur when lightning occurs.
5. Does X usually occur without producing Y?	0	Visible lighting usually produces audible thunder.
6. Does X sometimes occur without producing Y?	0	It is believed that lightning always produces thunder, even when we fail to notice the thunder.
7. Does Y always occur very close in time and space to X?	+1	Thunder is thought to always occur at the same time and place as lightning.
8. Can we think of some reason why X would always produce Y?	+1	There are scientific reasons why lightning should always produce thunder.
9. Can we think of some reason why X would usually produce Y?	+1	There are scientific reasons why lightning should always produce thunder.
10. Can we think of some reason why X would occasionally produce Y?	+1	There are scientific reasons why lightning should always produce thunder.
11. Can we think of some reason	0	

why X would never produce Y?		No.
12. Can we think of some reason why X would usually not produce Y?	0	No.
13. Are there no other reasonable theories of how Y could be produced other than assuming X produced it?	0	There is the theory that thunder is a roar of angry gods or spirits.
14. Can we think of a fact or facts that are true, but which are surprising or unexpected if X causes Y?	0	No, we can't.
15. Can we think of some fact or facts that are true, but hard to explain unless X causes Y?	0	There may well be, but I can't think of any.
16. If X an undisputed reality that has been instrumentally measured or photographed?	+1	No one disputes that lightning exists, and it has been photographed.

So using this scoring system and adding up all the numbers, it turns out that the claim that thunder is caused by lightning ends up with a score of +7. In this case, the system seems to work well. We have a very clear cause and effect relation in this case, and the causal explanation has scored highly using the method I have proposed for judging the strength of a causal effect.

Thunder is actually produced by lightning

Now let us consider the claim that complex visible biological innovations are caused by random mutations and what biologists call "natural selection" (a term that is not literally accurate because blind unconscious nature does not literally select things). By "complex visible biological innovations" I refer only to things appearing in nature, not anything produced artificially by humans, and I refer only to things involving a high level of complexity (not mere superficial changes such as darkening). Below is how we can compute the score

of the causal claim that complex visible biological innovations are caused by random mutations and natural selection.

Y= The appearance of complex visible biological innovations, X = random mutations and natural selection		
1. Has Y always been observed occurring whenever X occurs?	0	Humans have not actually observed any complex visible biological innovations appearing. All such innovations appeared before 3000 B.C.
2. Has Y usually been observed occurring when X occurs?	0	Humans have not actually observed any complex visible biological innovations appearing.
3. Has Y sometimes been observed occurring when X occurs?	0	Humans have not actually observed any complex visible biological innovations appearing.
4. Has Y never been observed occurring when X occurs?	-1	Humans have never observed any complex visible biological innovations appearing.
5. Does X usually occur without producing Y?	-1	Scientists say that natural selection is constantly occurring, and that random mutations are constantly occurring. But still humans have never observed any complex visible biological innovations occurring.
6. Does X sometimes occur without producing Y?	-1	Scientists say that natural selection is constantly occurring, and that random mutations are constantly occurring. But still humans have never observed any complex visible biological innovations occurring.
7. Does Y always occur very close in time and space to X?	+1	Although we have not observed complex visible biological innovations occurring, it is claimed that random mutations and natural selection have always been occurring, so we can generously grant

		that when previous complex visible biological innovations occurred, they were close in time in space to random mutation and some type of survival of the fittest that might be metaphorically called "natural selection."
8. Can we think of some reason why X would always produce Y?	-1	We can think of no reason why random mutations and natural selection would always produce complex visible biological innovations, and scientists think that in most years they do not produce such a thing.
9. Can we think of some reason why X would usually produce Y?	-1	We can think of no reason why random mutations and natural selection would usually produce complex visible biological innovations, and scientists think that in most years they do not produce such a thing.
10. Can we think of some reason why X would occasionally produce Y?	-1	We can think of no reason why random mutations and natural selection would occasionally produce complex visible biological innovations, just as we can think of no reason why tornadoes passing through a city (which produce random effects and a kind of architectural "survival of the fittest") would occasionally produce complex new architectural innovations.
11. Can we think of some reason why X would never produce Y?	-1	We can think of several reasons why random mutations and natural selection would never produce complex visible biological innovations: (1) the fact that such complex

		visible biological innovations require such extremely high states of organization and fine-tuning that it seems impossible that they would ever be produced accidentally, just as houses of cards should never be formed by throwing a deck of cards into the air, and just as log cabins should never form from falling trees; (2) the fact that individual random mutations (point mutations) are merely tiny fragments of what is needed for a complex visible biological innovation, typically less than 1%; (3) the fact that natural selection (or a superior reproduction rate) never works in regard to some complex biological innovation until such an innovation has already appeared.
12. Can we think of some reason why X would usually not produce Y?	-1	Same as above.
13. Are there no other reasonable theories of how Y could be produced other than assuming X produced it?	-1	There are three other reasonable theories of how complex visible biological innovations might have happened (1) they might have been introduced by a divine creator; (2) they might have been introduced by extraterrestrial visitors wanting for Earth to eventually produce intelligent life; (3) they might have been produced by some cosmic life-force.
14. Can we think of a fact or facts that are true, but which are surprising or unexpected if X causes Y?	-1	The Cambrian Explosion in which most animal phyla originated rather suddenly is unexpected under the theory that complex visible biological innovations are

		produced by random mutations and natural selection, which have always been described as very slow and gradual effects.
15. Can we think of some fact or facts that are true, but hard to explain unless X causes Y?	+1	There probably are no such facts, given a wide variety of alternative possibilities, but let's grant this +1 point just to be charitable.
16. If X an undisputed reality that has been instrumentally measured or photographed?	0	"Natural selection" is disputed as a literally accurate term, on the grounds that only conscious agents select things. The main idea behind natural selection (that fit things reproduce more) has been disputed, on the grounds that it is unproven (for example, not-very-fit bacteria seem to reproduce at a much higher rate than mammals). Natural selection has never been instrumentally measured or photographed.

Shockingly, the theory that random mutations and natural selection produce complex visible biological innovations produces a score of only -8, which is 15 points lower than the score produced by the claim that lightning produces thunder and the claim that temperatures of 0 degrees Celsius or lower produce freezing. This very low score suggests that the theory that random mutations and natural selection produce complex visible biological innovations is far from being a strong causal claim.

Could it be that something is wrong with my method for evaluating the strength of causal claims? Let's try it again, testing it with the claim that accidental falls from high altitudes produce fatal injuries.

Y= Fatal injuries, X= accidental falls from high altitudes		
1. Has Y always been observed occurring whenever X occurs?	0	Occasionally someone will survive an accidental fall from a high altitude.
2. Has Y usually been observed	+1	Most people who

occurring when X occurs?		accidentally fall from high altitudes have fatal injuries.
3. Has Y sometimes been observed occurring when X occurs?	+1	Most people who accidentally fall from high altitudes have fatal injuries.
4. Has Y never been observed occurring when X occurs?	0	Most people who accidentally fall from high altitudes have fatal injuries.
5. Does X usually occur without producing Y?	0	Most people who accidentally fall from high altitudes have fatal injuries.
6. Does X sometimes occur without producing Y?	-1	Sometimes people accidentally fall from high altitudes without having fatal injuries.
7. Does Y always occur very close in time and space to X?	-1	Fatal injuries can occur without falling, such as in auto collisions.
8. Can we think of some reason why X would always produce Y?	0	A person accidentally falling from a high altitude may land in a soft surface like a haystack.
9. Can we think of some reason why X would usually produce Y?	+1	Given the acceleration produced by accidental falls from high altitudes, we can think of a reason why they would usually produce fatal injuries.
10. Can we think of some reason why X would occasionally produce Y?	+1	Given the acceleration produced by accidental falls from high altitudes, we can think of a reason why they would usually produce fatal injuries.
11. Can we think of some reason why X would never produce Y?	0	No.
12. Can we think of some reason why X would usually not produce Y?	0	No.
13. Are there no other reasonable theories of how Y could be	0	Fatal injuries can be produced by car crashes

produced other than assuming X produced it?		that do not involve falls from high altitudes.
14. Can we think of a fact or facts that are true, but which are surprising or unexpected if X causes Y?	0	No, we can't.
15. Can we think of some fact or facts that are true, but hard to explain unless X causes Y?	0	No, we can't.
16. If X an undisputed reality that has been instrumentally measured or photographed?	1	No one disputes there are accidental falls from high altitudes, and they have been photographed.

So according to this system, the overall strength of the claim that accidental falls from high altitudes produce fatal injuries is +3. While not as strong as the +7 scores reached by the theory that lightning causes thunder and the theory that temperatures below 0 degrees Celsius produce freezing, at least the scoring system has given a positive score to a strong causal claim. So it seems that the method I have suggested here works well in distinguishing between causal claims that are weak and those that are strong.

So why is it that we continue to have so many assertions of the claim that complex visible biological innovations are caused by random mutations and natural selection, despite the weakness of such a causal claim? It would seem the answer is: largely because this is a speech custom that is imposed by institutional powers that compel or prod people to say a particular thing.

We might also ask: why do millions of children in school state every day the false claim that there is "liberty and justice for all" in America? It is a fine thing for school children to "pledge allegiance to the flag, and to the republic for which it stands." But a BBC article tells us, "Prison rates in the US are the world's highest, at 724 people per 100,000." Very many of these people in prison should not be there, and are there because the people could not afford good lawyers, were imprisoned because of over-zealous drug laws, or were the victims of racial prejudice. Meanwhile many people who commited the worst kind of crimes between 2003 and 2009 suffered no legal penalties at all, because they were rich enough to afford skillful lawyers or politically protected. So it seems that while in the United States there is liberty and justice for most, there is neither "liberty for all" nor "justice for all." So why is it that millions of children every school day assert the false claim that in America there is "liberty and justice for all"? The answer is: because this is a speech custom that is imposed by institutional powers that compel or prod people to say a particular thing.

Posted by Mark Mahin at 7:26 AM 2 comments:

Labels: Darwinism, evolution, scientific explanations

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Saturday, November 23, 2019

If Accidents Can't Make Tables, How Can They Make Super-organized Biological Wonders?

Professors tell us that biological complexity has arisen through blind processes of evolution. They teach that random mutations and survival of the fittest have been sufficient to produce all the wonderful innovations we see in biological organisms.

To shed some light on whether this is a tenable notion, let us do some calculations that will help clarify how improbable it is that a very simple accidental invention could occur. If we are to imagine evolution producing some biological innovation, we have to allow that at least some simple invention would have to occur by chance before any biological reward would be achieved. For it is never true that an organism gets survival value by just developing something with one part or two parts. Everything that we can think of that is useful requires at the very least quite a few parts organized with some coordination. For example, before it could yield any biological reward, even the simplest vision system would have to be at least as complex as, say, a table. And before it could yield any biological reward, even the simplest wings would have to be at least as complex as a table. Both of these things (vision systems and wings) must actually be vastly more complicated than a table to work in even the most primitive way.

So let us use a table as an example of a very simple invention. How improbable is it that random pieces of wood in a forest would assemble in such a way as to make a table? If we find that this isn't too improbable, something that we might expect to see after a few thousand tries, it might bolster the idea that blind nature can accidentally make inventions.

We can define a table as a portable flat surface elevated by table legs. The requirements for a simple table are as follows:

1. there must be a table top
2. the lower surface of the table top must have four peg holes
3. there must be four table legs that fit into the peg holes.

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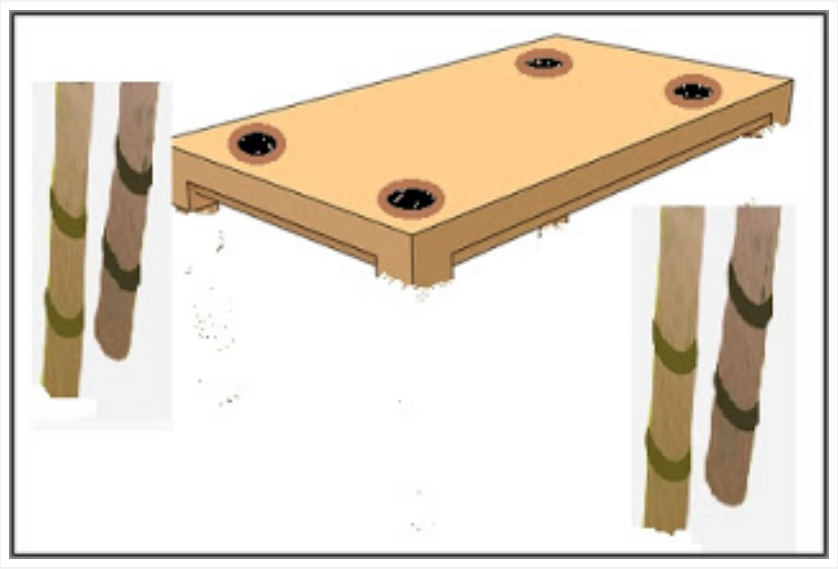
The visual below shows the parts that are needed (ignore the ring feature shown in the legs, which aren't necessary for the table working). We see the underside of the table top, with its four peg holes into which the table legs can fit.



Conceivably there could accidentally occur in nature some items that might act as the table top and the four table legs. We can imagine several logs accidentally bound together by vines that might end up looking a little like a rectangular table top. If the logs had varying widths, there might be gaps between the logs that could serve rather like peg holes. The "table legs" could be four other logs.

Given such a short requirements list, at first it may not seem too improbable that a table may form by chance. But let's do some math to get a clearer idea of the chance of such a thing forming accidentally.

To do the math, let us imagine a little machine we may call a Table Part Tumbler. The machine will be a spinning box, rather like the transparent spinning boxes they often use to randomly draw lottery numbers. Let us assume that this Table Part Tumbler is a cubic box that is two meters wide. Let us assume that there is a table top somewhere inside that volume of space. We will also assume that there are four table legs somewhere in this volume of space.

We can imagine that this box will be electrically powered, and spinning for a long time. We can imagine the box equipped with some artificial intelligence detector that will cause it to stop spinning whenever all four table legs fit into the four peg holes. The spinning may cause a table leg to accidentally enter one of the peg holes, or accidentally fall out of one of the peg holes. But once four peg holes are filled, the machine will stop spinning, because a table has been accidentally constructed.

Now these table legs could have any orientation at all in three dimensional space. They could be pointing straight up, or they could be pointing sideways, or they could be pointed at some angle to the left or the right. But for the table legs to accidentally fit into the pegs,

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► January (8)

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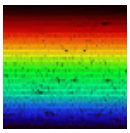
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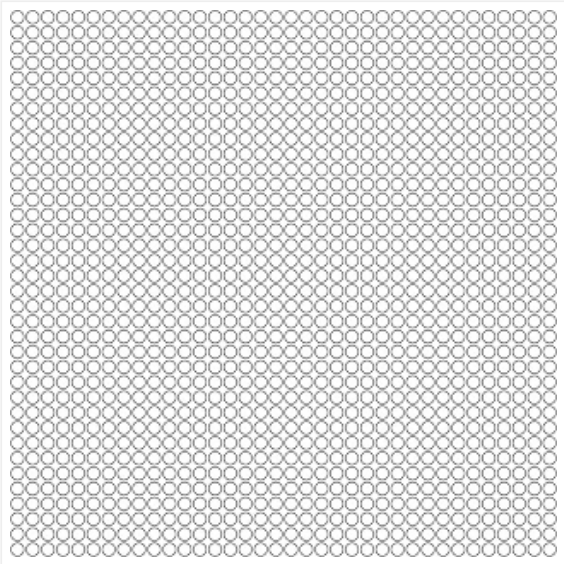
the legs must be perpendicular to the underside of the table top, pointing at one of the leg holes. How can we calculate the chance that a leg would be pointing in such a direction?

Here is a method that can be used. Let us assume that a table leg is about an eighteenth of a meter in width (about two inches). Now consider the top surface of our cubic box that is two meters across. In that top surface (two meters wide) there will be about 36 by 36 little areas as wide as one of these table legs. So you can imagine some 1296 little circles on the top face of our box.

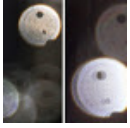
There are also five other faces of the cubic volume to consider: the side faces of the box, and the bottom face of the box. We can also imagine 1296 little circles on each of the four side faces of the box, and 1296 little circles on the bottom face and top face of the cubic volume, as in the diagram below:



To imagine an orientation of a table leg (its position in 3D space), we can imagine a line between one of these circles on the one face of the cubic box, and another circle on some other of the box's six faces. But if a table leg is oriented randomly in 3D space, each of the 1296 circles on the bottom face of the cubic volume can connect to any of 1296 circles on each of the other five faces of the cubic box (which is a total of 6480 circles).

So under these assumptions there will be a total of 1296 times 6480 ways in which a table leg could be oriented in three-dimensional space, or 8398080 possibilities. This is an example of what is called a combinatorial explosion. Such huge expansions of the number of possibilities occur all the time when we consider the number of ways parts can be arranged in three-dimensional space.

Given 4 leg holes in the table, the chance of a particular table leg having the right orientation to fit into one of the leg holes would only be about 1 in 8398080 divided by 4, or about 1 in 2099520. I say "divided by 4" because there are four leg holes that a particular table leg can fit into.



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So the chance of a particular table leg fitting into one of the leg holes would be only about 1 in 2099520. But what would the chance be that all four of the legs would accidentally fit into the leg holes at the same instant? Since the probability of each leg fitting into a peg hole is an independent probability, we follow the rule that to calculate the chance of four independent events occurring, we multiply together the probability of each occurring. That gives us a probability of 1 in 2099520 to the fourth power. This is a probability of about 1 in 1.94×10^{25}. In this model, the tumbling of the Table Part Tumbler can cause a leg to either fall in a leg hole or fall out of a leg hole. The odds would be greatly reduced if there was some rule that legs always stay in leg holes, but given the tumbling that is occurring, we should not assume such a rule.

If there were just one of these Table Part Tumbler machines, the chance of a table being produced in a billion years would be very low. Let's imagine that each second of spinning produces a different combination. There are about 3 quadrillion seconds (3×10^{16}) in a billion years. But with a probability of only about 1 in 1.94×10^{25} of the table legs all fitting into the peg holes at the same time, the chance of a table being assembled during the billion year period is very low, less than 1 in 100,000,000.

Now you may object that when evolution occurs that there is not just one organism, but many organisms in a population. So perhaps the odds would be better. But they wouldn't be. Each spin of our Table Part Tumbler is like a random mutation in a particular organism, occurring in one particular spot of the organism. Even if there is a very large population of organisms, we should not expect that there will be more than one random mutation per second in one particular part of any of those organisms. For example, even if there are millions of eyeless fish in some particular population, fish that are being born and dying at various times, we would not expect that there would be more than one mutation per second in this entire population corresponding to the little spot of the fish where it might have an eye.

Moreover, for the sake of conceptual simplicity, our model of the Table Part Tumbler has ignored several difficulties that would worsen the odds very much. Consider the following:

(1) The model assumes that there are four peg holes that match the size and shape of the four table legs. But if the model were to better simulate random evolution, then both the width of the table legs and the width of the pegs would be randomly varying, and both the shape of the table legs and the shape of the pegs would be randomly varying, which would very much worsen the odds of the table forming.
(2) The model has done nothing to factor in the extremely low probability of three or four logs being linked together by vines so you would have a flat table-like surface with four gaps resembling peg holes.
(3) While wood logs might last for a very long time, after not many

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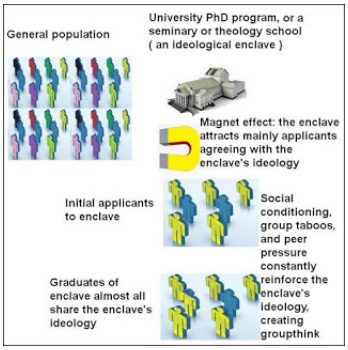

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years there would occur decay that would rot away any vines that linked together three or four logs to make a flat table top. So if you ever were to have a freak occurrence that created a flat surface resembling a table top with peg holes, by vines linking together logs, such an improbable arrangement would not persist for longer than a few centuries. So instead of having a billion years for the table legs to fit into the table pegs, there would actually be only rare centuries (occasionally occurring during million-year periods) in which there was a possibility of such a fit.

Altogether these factors would make it quadrillions of times less likely that the table would ever randomly assemble from accidental events in a forest. Given such factors which would vastly worsen the chance of a table being formed accidentally, and the very low probability previously calculated for the chance of all four legs fitting into the peg holes, it seems fair to conclude that the chance of a table (consisting of five or more parts fitting together in the right way) being assembled accidentally on any forest on Earth during a five-billion year period is less than 1 in 100,000,000. Such an estimate is consistent with the fact that no one has ever observed any table-like structure (consisting of 5 or more parts fitting together in the right way to make a table) that accidentally formed in a forest.

What does this exercise suggest? It suggests that the chance of even the simplest invention (requiring five or more parts) occurring from random events is very, very low, even given billions of years for random mutations to occur. We can put the matter concisely by saying: *typically even the simplest of inventions (requiring exactly the right organization of five or more parts) are extremely unlikely to occur by chance, even if there are quadrillions of random attempts.* In the crude mathematical model presented above, there are more than a quadrillion attempts, but the likelihood of the table accidentally appearing is still very, very low.

These calculations are consistent with the average man's intuitive insight on this matter. The average man intuitively grasps the general truth that useful feats of construction requiring multiple parts fitting together do not occur by accident.

A table is a ridiculously simple thing compared to biological innovations such as prokaryotic cells, eukaryotic cells, eyes, wings, cells, DNA, and the molecules needed for photosynthesis and respiration. What would the odds be if we were to calculate the chance of the simplest prototype of an eye appearing, or the simplest prototype of a cell, or the simplest prototype of one of the proteins needed for a vision, or any of thousands of similar things? It would be some probability incredibly smaller than the probabilities I have mentioned concerning the accidental appearance of a table.

These considerations strongly suggest that the origin of complex biological innovations by random mutations and natural selection is impossible. Is there some way that natural selection can get us out of

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
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- argument from evil (3)
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- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

this jam? No, there is not. Natural selection or survival of the fittest can only get started (in regard to some biological innovation) when some biological innovation progresses to the point where some survival advantage is yielded. We may call this point the rewards threshold. Achieving such a reward threshold will always require at least some biological invention vastly more complicated than the very simple invention that is a table. And in almost every case the rewards threshold will not be reached until there is some biological innovation far more complicated and vastly more unlikely to occur by chance than a table.

Inside the human body are more than 20,000 types of protein molecules. Most of these protein molecules are complicated things, usually consisting of a special arrangement of more than 300 amino acids. Protein molecules only are functional if they fold in just the right way to achieve a particular three-dimensional shape. A slight change in the sequence of amino acids in a protein molecule will prevent it from folding, and will make the molecule useless. A protein molecule cannot originate through some process of accumulation, because the molecule is useless if only a third of it or half of it exists. Natural selection will not do anything to move a non-beneficial protein molecule closer and closer to a state of being beneficial. On a biochemical level, we may say that there are more than 20,000 complex inventions in each of our bodies, those inventions being our protein molecules. How many of these would we expect to exist, under current evolutionary assumptions? Not a single one of them. The problem of explaining the origin of protein molecules was unknown to Darwin, who knew nothing of the immense complexity of either protein molecules or cells.

It is easy to roughly calculate the chance of a functional protein molecule appearing by chance. There are 20 amino acids used by living things, and the number of amino acids in a human protein varies from about 50 to more than 800. The scientific paper here refers to "some 50,000 enzymes (of average length of 380 amino acids)." According to the page here, the median number of amino acids in a human protein is 375, according to a scientific paper. The simplest calculation you could make is to calculate that the chance of a protein molecule appearing in its current form from a chance combination of amino acids is about 1 in 20 to the 375th power. But that assumes that the protein molecule would not be functional unless it was exactly the way it is. We do know of many reasons for assuming that for a protein molecule to be functional, a protein molecule has to be nearly the same as it is. Protein molecules are highly sensitive to mutation changes, so sensitive that changing randomly changing ten or twenty amino acids will typically disable the protein. This paper here estimates a probability of about 34% that a random amino acid change will produce a "functional inactivation" of a protein molecule. But that doesn't quite mean that a protein molecule has to be *exactly* as it is to be functional.

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
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- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
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- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

Let us generously assume that there are many variations of a particular protein molecule that would still be functional. A reasonable way to allow for such variation is to assume that only half of the amino acids need to have their current arrangement. That would still leave you with a probability of about 1 in 20 to the 187th power for the chance of a typical protein molecule appearing from a chance combination of amino acids. That likelihood is about 1 in 10 to the 243rd power, which is smaller than the chance of you guessing correctly all of the ten-digit telephone numbers of 24 consecutive strangers. It's a likelihood so small we would never expect it to happen by chance in the history of the observable universe.

In his interesting recent book *Cosmological Koans*, which has some nice flourishes of literary style, the physicist Anthony Aquirre tells us about just how complex biological life is. He states the following on page 338:

"On the physical level, biological creatures are so much more complex in a functional way *than current artifacts of our technology that there's almost no comparison. The most elaborate and sophisticated human-designed machines, while quite impressive, are utter child's play compared with the workings of a cell: a cell contains on the order of 100 trillion atoms, and probably billions of quite complex molecules working with amazing precision. The most complex engineered machines -- modern jet aircraft, for example -- have several million parts. Thus, perhaps* all the jetliners in the world *(without people in them, of course) could compete in functional complexity with a lowly bacterium."*

Our Darwinist professors are blissfully ignorant of the math that crushes their explanatory pretensions. Acting rather like Darwin, who had no interest or ability in mathematics, our Darwinist professors pay no attention to combinatorial explosions, and in general pay little attention to mathematics. When they do mathematics, it is usually some type of tangential side calculation rather than the type of calculation that is most relevant to the likelihood of Darwinian evolution. What Darwinist professors mainly do is tell stories, and concentrate on narrative repetition, endlessly repeating claims that miracles of complex construction occurred by accident. But such thinkers are careful to never use the unintentional-sounding word "accident" when describing their theory of a 100% unintentional origin of biology wonders. Instead, they use the very *intentional*-sounding phrase "natural selection" to describe their theory of a 100% *unintentional* origin of biology wonders, which isn't terribly forthright.

The lack of relevant probability calculations by Darwinist professors bothered the eminent physicist Wolfgang Pauli, discoverer of the subatomic Pauli Exclusion Principle on which our existence depends. Pauli stated the following:

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

"I should like to critically object that this model has not been supported by an affirmative estimate of probabilities so far. Such an estimate of the theoretical time scale of evolution as implied by the model should be compared with the empirical time scale. One would need to show that, according to the assumed model, the probability of de facto *existing purposeful features to evolve was sufficiently high on the empirically known time scale. Such an estimate has nowhere been attempted though."*

Pauli also stated the following about Darwinist biologists:

"In discussions with biologists I met large difficulties when they apply the concept of 'natural selection' in a rather wide field, without being able to estimate the probability of the occurrence in a empirically given time of just those events, which have been important for the biological evolution. Treating the empirical time scale of the evolution theoretically as infinity they have then an easy game, apparently to avoid the concept of purposesiveness. While they pretend to stay in this way completely 'scientific' and 'rational', they become actually very irrational, particularly because they use the word 'chance', not any longer combined with estimations of a mathematically defined probability, in its application to very rare single events more or less synonymous with the old word 'miracle'."

In general, Darwinist professors ignore the mountainous improbability of parts fitting together to make complex innovations. Our Darwinist experts typically speak as if having the parts for something is about as good as having that thing, ignoring the reality that the more complex something is, the more improbable that parts would accidentally fit together to make that thing, even if all the parts were present. How often have we heard SETI enthusiasts speaking as if having "the building blocks of life" in space (by which they mean mere amino acids) was almost as good as having a living thing (which requires at least a fantastically improbable special arrangement of such building blocks)?

Roughly speaking, we can say that the improbability of a complex innovation appearing accidentally usually rises *exponentially and geometrically* as the number of parts needed for that innovation undergoes a simple linear increase, in most cases when a special arrangement of the parts is required. Similarly, the improbability of you throwing a handful of cards into the air and having them all form into a house of cards will rise exponentially and geometrically as the number of cards in your hand undergoes a simple linear increase. Getting a two-card house of cards by accident isn't too hard, by having two cards lean together diagonally. But if all the humans in the world spent their whole lives throwing a deck of cards into the air, none of these random throws would ever produce a 20-card house of cards by accident.

I have spoken about logs, and it is interesting that orthodox biologists are unable to account for the current distribution of animals in the

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

world without resorting to some very unbelievable tall tales in which logs play a part. For example, there are many similarities between Old World monkeys and New World Monkeys. Committed to the assumption that such similarities must be because of common descent, Darwinist professors maintain that the New World monkeys are descendants of the Old World monkeys, and that such an ancestry was able to occur because some Old World monkeys rafted across the Atlantic ocean something like 40 million years ago, arriving in the New World. Such an idea is supremely unbelievable for several reasons: (1) the incredible improbability of a sea-worthy raft appearing accidentally from logs; (2) the almost equally great improbability that any monkeys would ever swim out to sea and jump on such a raft; (3) the almost equally great improbability that such monkeys could ever survive a voyage across the Atlantic. You can calculate the improbability of item (1) by doing calculations similar to those I have done in regard to a table. The chance of a sea-worthy raft appearing accidentally are almost as bad as the chance of a table appearing accidentally.

You can make some rough estimates:
(1) Chance per year that a stable raft might accidentally form, one sea-worthy enough to take monkeys across the Atlantic: less than in a trillion.
(2) Chance that monkeys would ever swim out and jump on such a raft, and stay on it as it floated out to sea: less than 1 in a billion.
(3) Chance that monkeys on such a raft would ever survive a voyage across the Atlantic: less than 1 in a thousand.

The overall likelihood of such a trans-Atlantic monkey voyage per year would be less than the product of all three of these independent probabilities multiplied together: 1 in a trillion times 1 in a billion times 1 in a thousand, which gives a probability of less than 1 in 1,000,000,000,000,000,000,000,000 per year. The chance that such a thing would have occurred during a 10-million year window of opportunity is, according to such an estimation, less than 1 in 10,000,000,000,000,000. But as fantastically improbable as such an event would have been, it would still have been trillions of times more probable than the cases of accidental engineering that our biologists ask us to believe in.

In the willingness of some to accept these supremely absurd tales of trans-Atlantic rafting monkeys, we see what seems to be an example of what is called escalation of commitment. Having wedded themselves to the notion of a purposeless origin of biological organisms, certain people will seemingly accept many an absurdity that follows from such an idea. At no point does it ever occur to such people to ask whether credulity has been strained too much. Innumerable weighty straw-bundles are heaped upon the camel's back, each a new belief requirement required by the original assumption; and such people will never ask whether the latest one has broken the camel's back, requiring one to finally look for alternatives to the original assumption. Faced with evidence of extremely precise fine-

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

tuning in the universe's fundamental constants, which dramatically subverts their "purposeless nature" assumptions, such people will not hesitate to postulate a multiverse of innumerable universes, which is like piling a million additional straw bundles on the camel's back.

Posted by Mark Mahin at 8:51 AM No comments:

Labels: biology, Darwinism, evolution, origin of biological complexity

Thursday, October 24, 2019

The Goofs in His "Evolution and Probability"

In his scientific paper "Evolution and Probability," professor Luca Peliti raises the question of how evolution as described by Darwin could produce such wonders as the human eye. He then considers the problem of the origin of proteins. He states the following:

"*Living cells have a repertoire of 20 amino acids and proteins are made of linear chains of amino acids (called polypeptide chains). A typical enzyme (a kind of protein whose function is to fasten, sometimes by several orders of magnitude, the unfolding of chemical reactions) is about a hundred amino acids long. If we suppose that only one particular amino acid sequence can make a functional enzyme, the probability to obtain this sequence by randomly placing amino acids will be of the order of one over the total number of amino acid sequences of length 100, i.e.,* $20^{100} \approx 10^{30}$*."*

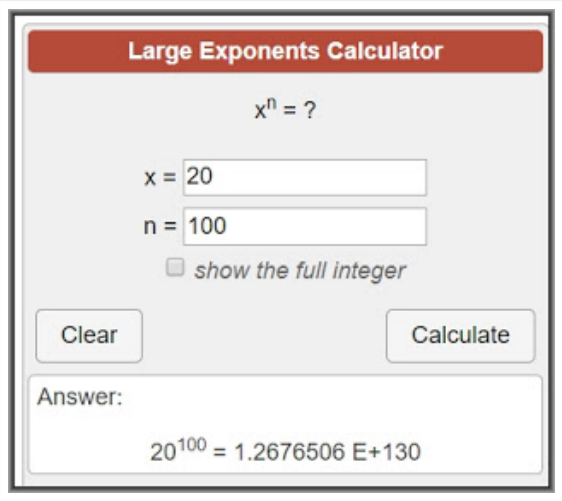
Peliti is talking about a very important reality here, the difficulty of protein molecules forming by any Darwinian process. The problem is very severe, partially because of the very great number of different types of proteins in the human body. Humans have more than 20,000 types of protein molecules, specified by about 20,000 genes, each of which lists the amino acid sequence used by a protein. Each protein uses a different sequence of amino acids.

Peliti has committed two very serious errors in the passage quoted above. The first is that he has committed a careless math error in telling us that 20 to the hundredth power is equal to about ten to the thirtieth power. Twenty to the hundredth power is actually equal to ten to the *one hundred and thirtieth* power. Twenty to the hundredth power is equal to 1.2676506 X 10^{130}. In other words, $20^{100} \approx 10^{130}$ rather than $20^{100} \approx 10^{30}$ as Peliti stated. This difference is kind of all the difference in the world, because 10^{130} is more than 1,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000 times larger than 10^{30}. If there was a chance of about 1 in 10^{30} that a functional protein could appear by chance, that would be a likelihood very slim but perhaps something we might expect to occur, given countless

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

million years for random trials. But if there was a chance of about 1 in 10^{130} that a functional protein could appear by chance, that would be a likelihood so small that we would never expect it to happen in the history of the universe.

The screen shot below (from an online large exponents calculator) shows a conversion that corresponds to the one stated in the previous paragraph.

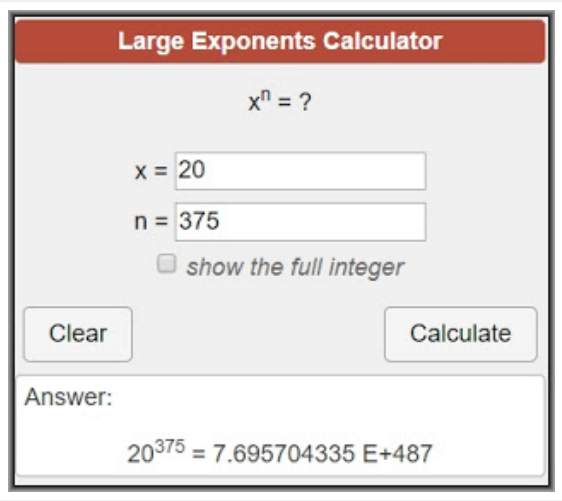


The second major error committed by Peliti in the passage quoted above is that he has seriously misstated the typical number of amino acids in a protein molecule or enzyme (an enzyme is a type of protein molecule). The number of amino acids in a human protein varies from about 50 to more than 800. The scientific paper here refers to "some 50,000 enzymes (of average length of 380 amino acids)." According to the page here, the median number of amino acids in a human protein is 375, according to a scientific paper. The difference between Peliti's suggestion that protein molecules such as enzymes have about 100 amino acids and the reality that they have a median of about 375 amino acids turns out to be a gigantically big difference when you calculate the probability of a protein forming by chance, a difference almost infinitely greater than the 375% difference between 100 and 375.

Let us do a calculation using the correct numbers and correct math. There are 20 amino acids used by living things. The median amino acid length of a human protein is 375 amino acids. So to calculate the chance of a set of amino acids randomly forming into the exact set of amino acids used by a functional protein such as an enzyme, the correct figure is 1 in 20 to the three-hundred-and-seventy-fifth power. This is a probability of about 1 in 10 to the four-hundred-eighty-seventh power. Very precisely, we can say that the chance of a random sequence of amino acids exactly matching that of a protein with 375 amino acids is a probability of 1 in $7.695704335 \times 10^{487}$. That is a probability similar to the probability of you correctly guessing (with 100% accuracy) the ten-digit telephone

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

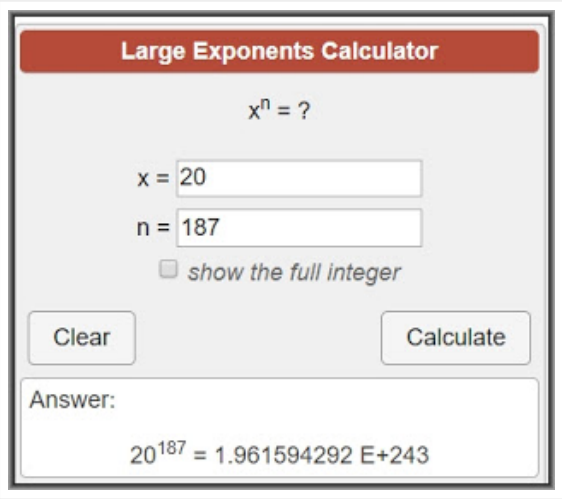
numbers of 48 consecutive strangers. The calculation is shown in the visual below:



Now, for a protein such as an enzyme to function properly, it must have a sequence of amino acids close to its actual sequence. Experiments have shown that it is easy to ruin a protein molecule by making minor changes in its sequence of amino acids. Such changes will typically "break" the protein so that it will no longer fold in the right way to achieve the function that it performs. A biology textbook tells us, "Proteins are so precisely built that the change of even a few atoms in one amino acid can sometimes disrupt the structure of the whole molecule so severely that all function is lost." And we read on a science site, "Folded proteins are actually fragile structures, which can easily denature, or unfold." Another science site tells us, "Proteins are fragile molecules that are remarkably sensitive to changes in structure." But we can imagine that a protein molecule might still be functional if some minor changes were made in its sequence of amino acids.

Let us assume that for a protein molecule to retain its function, at least half of the amino acids in a functional protein have to exist in the exact sequence found in the protein. Under such an assumption, to calculate the chance of the functional protein forming by chance, rather than calculating a probability of 1 in 20 to the three-hundredth-and-seventh-fifth power, we might calculate a probability of 1 in 20 to the one-hundred-eighty-seventh power (187 being about half of 375). This would give us a probability equal to about 1 in 10 to the two hundred and forty-third power, a probability of about 1 in 10^{243}. The calculation is shown below.

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)



So even under the probably-too-generous assumption that perhaps only half of a protein's amino acid sequence has to be just as it is, we still are left with a calculation suggesting that a functional protein could never form by chance. The probability above is about the probability of you correctly guessing the 10-digit phone numbers of 24 consecutive strangers. It would seem that some miracle of luck would be required for a particular type of functional protein molecule to form. Since there are billions of different types of functional protein molecules in the biological world, you need to believe in *billions* of miracles of luck to believe that such things appeared naturally.

Peliti does get the math rather right in the excerpt below, in which he describes what he later calls a "garden of forking paths":

"*We can recast this argument in the following way. Let us suppose, following Dawkins... that 1000 evolution steps are necessary to obtain a working eye, and that at each step there are only two possibilities: the right or the wrong one. If the choice is made blindly, the probability of making the right choice at any step is equal to 1/2 . Then the probability of always making the right choice at every step is equal to* $1/2^{1000} \approx 1/10^{300}$. *It is clear that the fact that our lineage made the correct choice at each step looks nothing less than miraculous!*"

The math here is reasonable. So we have two different ways of calculating things, and both have given us a likelihood of no more than about 1 chance in 10 to the two hundredth power. Such miracles of chance would need to happen not just once but very many times for the biological world to end up in its current state.

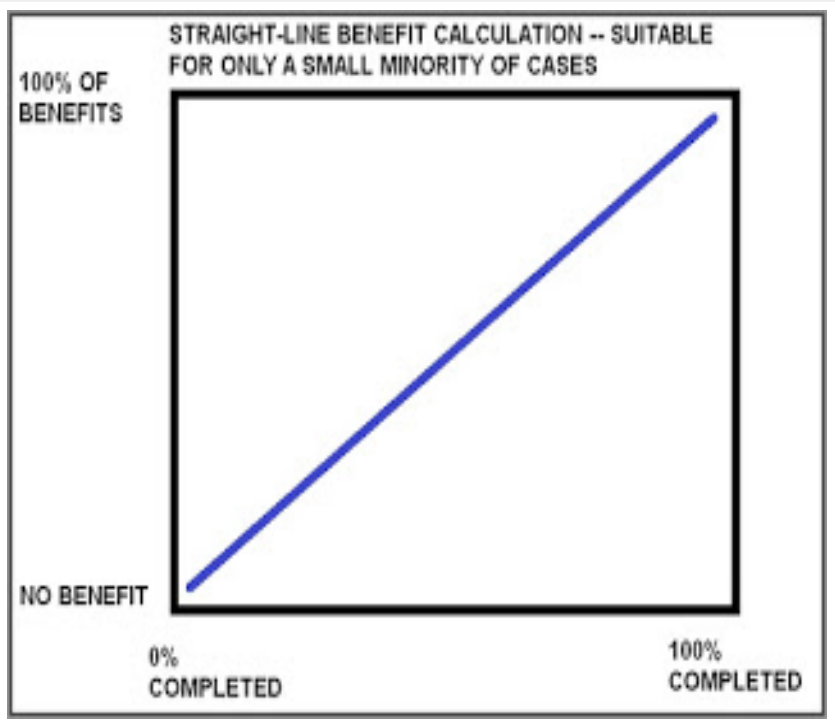
After raising this protein origin problem and the problem of the origin of complex biological systems like the vision system, Peliti attempts to address such origin problems. Peliti begins to reason like this:

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

"In the argument we just discussed we assumed that one does not know if one is on the right path until the end is reached. Let us suppose instead that each step made in the good direction provides a small advantage in terms of survival or fecundity to the being that makes it. More precisely, let us imagine to send in this 'Garden of forking paths' a group of, say, 100 individuals, who perform their choice (right or wrong) at each step, and then reproduce. Let us assume that those who make the right choice at the right moment have slightly more offspring than those who make the wrong one: for instance, that for each offspring of an individual who made the wrong choice, there are 1.02 offspring (on average) of one who made the right choice. Thus, after the first step, we shall have 50 individuals on the right side and 50 on the wrong side and, after reproduction, 102 on the right side and 100 on the wrong side. This is surely a very small difference: the fraction of individuals on the right path is 51% rather than 50%. However, if we wait a few generations, the fraction of individuals on the right side will increase: after 10 generations the ratio of the number of offspring of an individual who had made the right choice to that of one who made the wrong choice will be about 1.22, and after 100 generations it will be about 7.25."

Peliti then goes further and further with such reasoning, eventually reaching the conclusion that something like an eye might appear after 300,000 generations. I need not discuss his full line of reasoning, and will simply note that Peliti's entire line of reasoning is fallacious because of the bad assumption that he has made at the beginning, the assumption that he states as, "Let us suppose instead that each step made in the good direction provides a small advantage in terms of survival or fecundity to the being that makes it."

An assumption like this is what we may call a "benefit-with-every-step" assumption. Such an assumption can be visually represented like this:



Graph 1

The graph above shows a type of situation in which 10% completion yields 10% of the benefits of full completion, 20% completion yields 20% of the benefits of full completion, and so on and so forth, with 50% completion yielding 50% of the benefits of full completion, and 100% completion yielding 100% of the benefits of full completion.

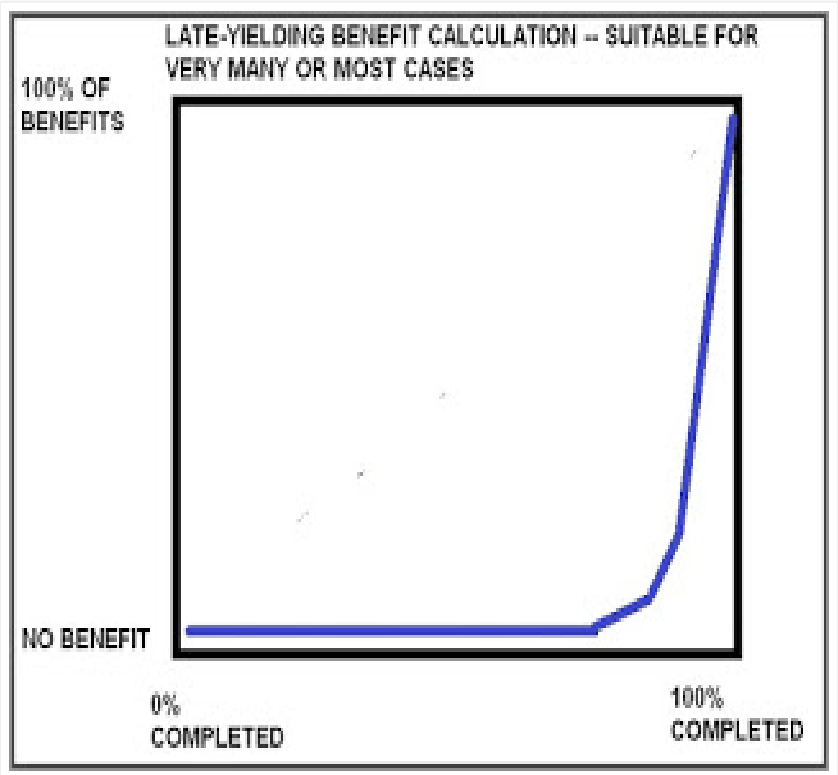
A straight-line benefit calculation is suitable for a small minority of cases. For example, if you are a farmer who plants and harvests 10% of his farming field, you will get 10% of the benefit of planting and harvesting 100% of the field. And if you are a street vendor who sells 20% of the items in your vendor's wagon, you will get 20% of the benefit of selling 100% of the items in your wagon.

But it is obviously true that in life in general and in biology in particular, it is very often totally inappropriate to be using such a straight-line benefits calculation or to be making a benefit-with-every-step assumption. Here are some of the innumerable examples I could give to prove such a point:

1. Completing 30% of your SAT examination doesn't give you 30% of the benefit of completing 100% of the examination; instead it leaves you with a very bad score that doesn't do you any good at all.
2. Completing 50% of a suspension bridge across a river doesn't give you a bridge that is 50% as good as a full bridge; instead it leaves you with a bridge that is a suicide device because people driving across will find their cars falling into the river.
3. Completing 20% of an airplane doesn't give you something that flies 20% as fast or as high as a full airplane, but merely gives you something that doesn't fly at all.

4. Completing 20% of a television set doesn't give you something that gets 20% as many channels as a full TV set, but merely gives you something that doesn't display TV programs.
5. If you have 20% of a functional protein molecule, the molecule won't perform its function, and won't do anything.
6. If you build only 20% of a rocket designed to launch satellites, that rocket won't be able to reach orbit, and will produce no benefits at all.
7. A woman with 20% or 30% of her reproductive system won't be able to have 20% of a baby; instead, she won't be able to have any baby at all.
8. Having only one quarter of a circulatory system (such as only veins or only arteries or only half a heart) provides no benefit at all.

We can call these type of cases late-yielding cases or "halfway yields nothing" cases. In all such cases, it is utterly inappropriate to use a benefit-with-every-step assumption or a straight-line benefit calculation, and it is utterly inappropriate to be evoking slogans such as "every step yields a benefit." What type of graph would be appropriate to illustrate such cases? Rather than a straight-line graph, it would be a graph with a J-shaped line that stays flat for the first half of the graph, and then slopes up sharply. The graph would look rather like this:



Graph 2

The exact slope of such a curve would differ from one late-yielding situation to another, but in each case the curve would never be a straight-line curve but a curve rising sharply in the end stages, without any benefit in the earliest stages.

Now, which one of these two calculations would be appropriate to use when considering the case of the evolution of a vision system? Clearly the appropriate calculation would be like that shown in the “late yielding benefit calculation” graph (Graph 2), and not a calculation like that shown in the “straight-line benefit calculation” graph (Graph 1).

Let us ignore the red-herrings often thrown about when discussing such an issue, such as an appeal to the light-sensitive patches of earthworms. Humans are part of the chordates phylum, which is an entirely different phylum from the phylum of earthworms (the platyhelminthes phylum). No one believes that humans are descended from earthworms.

If we look at the fossil record of the phylum that humans belong to (chordates), we see no evidence that chordate eyes evolved from some mere light-sensitive patch such as on an earthworm. When considering the possible evolution of vision systems, we should be using something like a late-yielding benefit calculation and a “halfway yields nothing” assumption.

People very often speak as if “eyes=vision,” but such an assumption is false. For an organism to have vision, it is necessary to have a complex system consisting of many different things, including the following:

1. A functional eye requiring an intricate arrangement of many parts to achieve a functional end.
2. One or more specialized protein molecules capable of capturing light, each consisting of many amino acids arranged in just the right way to achieve a functional end.
3. An optic nerve stretching from the eye to the brain.
4. Extremely specialized parts in the brain necessary for effective vision.

All of these parts must be necessary for vision, so we clearly have here a situation that is not correctly described by an “every step yields a benefit” calculation. The correct assumption would be a “halfway yields nothing” assumption and a late-yielding benefits calculation.

We can give the name "the benefit-at-every-step fallacy" for the type of fallacy Peliti has committed by saying, "Let us suppose instead that each step made in the good direction provides a small advantage in terms of survival or fecundity to the being that makes it." I can define the benefit-at-every-step fallacy as the fallacy of assuming that benefits will be yielded throughout a process that only yields benefits in its late stages. Here is an example of such a fallacy (I'm not quoting here from Peliti's paper):

Dave: *"If I slowly buy up a whole bunch of auto parts at the junkyard, and assemble them into a car, in about 5 weeks I'll have a car I can sell for $1000. 1000 divided by 5 is 200. So I'll get an average of $200 a week, and that will pay my rent while I'm working on the car."*

Dave has committed here the benefit-at-every-step fallacy, just like Peliti. Dave's labors will not actually yield any benefits until he has finished, or almost finished, the car he is working on.

A vision system is only one very complex thing that we would need to explain to naturally explain the origin of creatures such as humans. By far the biggest explanatory problem is explaining the origin of protein molecules. There are more than 20,000 different types of protein molecules in the human body, most specialized for some particular functional purpose. In the animal kingdom there are more than 10 billion different types of protein molecules, most of which are properly considered as complex inventions. The science site here estimates that there are between 10 billion and 10 trillion "unique protein sequences" in the animal kingdom. Most protein molecules have very hard-to-achieve folds necessary for their functionality. The science site here says "there are few common folds" in the protein universe. This means we have billions of complex biological inventions that we need to account for, for there are billions of different types of protein molecules in the natural world, each its own distinct complex invention.

When considering the appearance of protein molecules, we would have to use a late-yielding benefit calculation as shown in Graph 2 above, and not at all a straight-line benefit calculation as shown in Graph 1 above. It is certainly not true that the formation of 10% of a protein molecule gives you 10% of the benefit of the full molecule, or that the formation of 20% of a protein molecule gives you 20% of the benefit of the full molecule. It is instead usually true that having 50% of a protein molecule leaves you with a completely useless molecule. To be functional, protein molecules require complex hard-to-achieve folds. If you remove any 50% of their amino acid sequence, the protein molecules will not be functional, for reasons such as they cannot achieve the folds on which their functionality depends. Almost certainly, a large percentage of protein molecules will be nonfunctional if they have only 70% of their amino acids. (See the end of this post for some scientific papers supporting these claims.) As a biology textbook tells us, "Proteins are fragile, are often only on the brink of stability."

Indeed, a large percentage of protein molecules are not even independently functional if they have *100%* of their amino acids, because of external functional dependencies of such protein molecules. According to this source, between 20 to 30 percent of protein molecules require other protein molecules

(called chaperone molecules) for them to fold properly. Very many other protein molecules are not independently functional, because their function only arises when they act as team members in complex teams of proteins called protein complexes. The answer to the question "what good is 50% of a protein molecule" is usually "no good at all," and in regard to a large fraction of protein molecules, the correct answer to the question "what good is 100% of a protein molecule" is "no good at all, unless there also exists one or more other protein molecules that the first protein molecule requires to be functional."

All over the place in biology we see extremely complex innovations and intricate systems requiring many correctly arranged parts for minimal functionality, particularly when we look at the byzantine complexities and many "chicken or the egg" cross-requirements of biochemistry. That's why a physicist recently told us that even the simplest bacterium is more complex and functionally impressive than a jet aircraft. It is in general true that the more complex or intricate an innovation or system (biological or otherwise), the more likely that it falls under a late-yielding benefit calculation (as depicted in Graph 2) in which something like a "halfway yields nothing" assumption is correct, and the less likely that such an innovation or system falls under a "benefit at every step" calculation (as depicted in Graph 1) in which we can assume that the addition of each part produces a benefit. It is a gigantic mental error to assume or insinuate that very complex biological innovations should be typically described by a simplistic "benefit at every step" calculation such as depicted in Graph 1. But our ideologically motivated biologists have been making such an error for well over a century, and Peliti has merely repeated their error.

Later in his “Evolution and Probability” paper, Peliti appeals to the concept of “selective pressure.” That term (also called "selection pressure") is simply a variation of "natural selection," a variation designed to impress us with the idea that something like physics is going on (even though nothing like that is at play).

Here is a case where something a little like “selection pressure” might actually occur. Let us imagine a population (a group of organisms of the same species) where 10% of the organisms have some favorable trait that makes it more likely for them to survive and reproduce, and 90% of the organisms do not have such a trait. Then, over many generations, it might be that this trait might become more common in such a population, because those with the trait might reproduce more. In such a case, over many generations the percentage of the population with such a trait might increase. The 10% of the population with the trait might increase to 15%, then 20%, and so forth. One could use the term “selection pressure” to refer to such a tendency,

although the term is actually doubly misleading; for there is no actual selection occurring (unconscious nature is not making a choice), and there is no actual pressure involved (pressure being a physical pushing force that is not occurring in this case). The fact that "natural selection" does not actually describe a choice or selection is why Charles Darwin wrote in 1869, "In the literal sense of the word, no doubt, natural selection is a false term."

But let us imagine some complex biological innovation that yields no benefit until more than 70% of it appears. It would be absolutely wrong and misleading to claim that the biological innovation had occurred because a "selection pressure" had pushed nature into forming such an innovation. During the first half of the imagined gradual formation process, there would have been no benefit from the appearance of 5% or 10% or 15% or 25% of such a biological innovation. So there would be no "selection pressure" at all that would have caused nature to pass through such stages.

But our biology dogmatists have constantly ignored such obvious truths, and have used the term "selection pressure" in an utterly inappropriate way. They will take some fantastically improbable biological innovation, and speak as if "selection pressure" pushed such a thing into existence. In reality, selection pressure would never occur in regard to any biological innovation until that innovation first appeared in some beneficial form. It is a complete fallacy to talk about "selection pressure" causing novel biological innovations whenever such innovations are late-yielding innovations that are nonfunctional in a fragmentary form.

Peliti is one of the biology theorists who has misused the concept of selection pressure. His error is shown in the passage below from his "Evolution and Probability" paper:

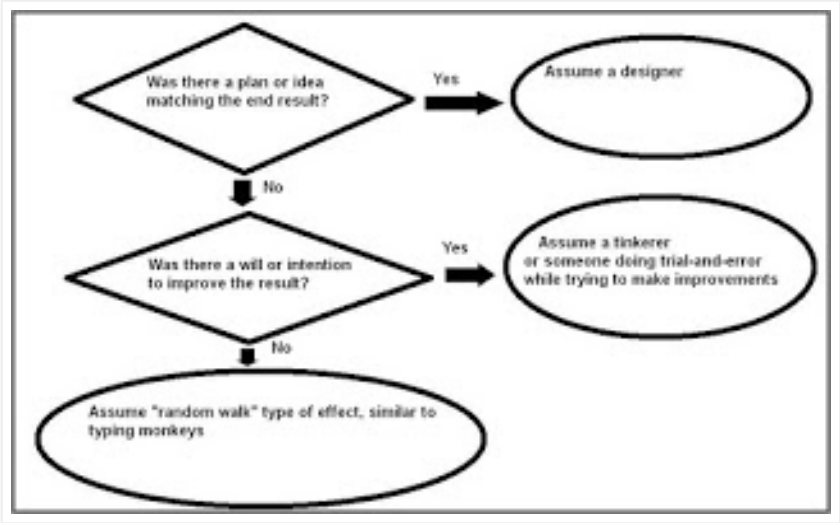
"*We can summarize this discussion by stressing two main points: one, that an evolutionary history that appears extremely improbable a priori looks much more probable a posteriori, looking back from the arrival point, since a constant selective pressure has acted during the whole path, favoring advantageous variants with respect to disadvantageous ones.*"

Here Peliti is again guilty of the "benefit-at-every-step" fallacy so often committed by biology dogmatists. Because very complex biological innovations such as protein molecules and vision systems and reproductive systems usually do not provide any benefit when only small fractions of them exist (and very often do not provide any benefit when less than 60% or 70% of them exist), it is absolutely erroneous to assume that a "constant selective pressure has acted during the whole path" to produce complex innovations, while thinking along the lines of "every step provides a benefit." There would typically be no

selection pressure at all (and no benefit to survival or reproductive fecundity) until such extremely complex and hard-to-achieve biological innovations achieved a functional threshold, which would very often require fantastically improbable arrangements of matter that we would never expect to occur by chance (or by Darwinian evolution) in the history of the universe.

Besides the fact that thinkers such as Peliti cannot credibly explain the origin of protein molecules such as those used in vision systems, there is the gigantic problem that no imaginable change in DNA can explain biological innovations such as vision systems, because the structure of such systems is nowhere specified in DNA. Contrary to the frequent mythical statements made about DNA being a blueprint for a human or a recipe for making a human, the fact is that DNA only specifies very low-level chemical information like the amino acid sequences of proteins. Not only does DNA not specify the structure of a human eye, it does not even specify the structure of any of the specialized cells used by the eye (such as the specialized cells used by cones and rods of the eye), or the structure of any other cells. So any claim to explain the appearance of vision systems based on changes in DNA (with or without natural selection and with or without lucky random mutations) is futile. The fact that DNA does not specify biological body plans or phenotypes is discussed very fully here.

Through abused phrases such as "selection pressure," our biology theorists confuse us about probabilities. The flowchart below helps to clarify the reality. Consider some imagined path of biological progression. The first question to ask is: was there a plan or idea matching the end result? If you think the answer is no, then go to the second question: was there a will or intention to improve the end result? If you think the answer to that question is no, then assume the progression occurred through a "random walk" effect like that of typing monkeys. In the case of Darwinian evolution, there is no plan or idea for any of the results, nor is there any will or intention to achieve the results. Darwinian evolution is properly described as a "typing monkeys" random-walk type of effect, with all the mountainous improbabilities associated with such a thing. Our biologists often tell us that "evolution is a tinkerer," although that analogy is false and deceptive. A tinkerer is an agent willfully attempting to improve something by using trial and error. There is no such willful agent present in Darwinian evolution.



From an information standpoint, the vast amount of functional information in genomes is comparable to books in a library. The most accurate analogy for Darwinian evolution is the analogy of typing monkeys producing a large library of impressive works of literature (or functional information such as computer programs), despite prohibitive odds against such a result. In fact, at the end of this recent essay, an evolutionary biologist ends up candidly comparing Darwinian evolution to typing monkeys. The keystrokes of the monkeys are analogous to random mutations. If you imagine one or more skyscrapers filled with typing monkeys, and a roving editor in each skyscraper searching for useful typed prose made by the monkeys, and making copies of such miracles of chance if they ever occur, with such a roving editor being analogous to natural selection, you will have a good analogy for the theory of Darwinian evolution.

I discussed how fine-tuned and sensitive to changes protein molecules are. Further evidence for such claims can be found in this paper, which discusses very many ways in which a random mutation in a gene for a protein molecule can destroy or damage the function or stability of the protein. An "active site" of an enzyme protein is a region of the protein molecule (about 10% to 20% of the volume of the molecule) which binds and undergoes a chemical reaction with some other molecule. Below are only a fraction of the examples of protein sensitivity and fragility cited by the paper:

"If a mutation occurs in an active site, then it should be considered lethal since such substitution will affect critical components of the biological reaction, which, in turn, will alter the normal protein function...Even if the mutation does not occur at the active site, but quite close to it, the characteristics of the catalytic groups will be perturbed....Changing the reaction rate, the pH, or salt and temperature dependencies away from the native parameters can lead to a malfunctioning protein....An amino acid substitution at a critical folding position can prevent the forming of the folding nucleus, which makes the remainder of the structure rapidly condense.

Protein stability is also a key characteristic of a functional protein, and as such, a mutation on a native protein amino acid can considerably affect its stability....When a protein is carrying its function, frequently the reaction requires a small or large conformational change to occur that is specific for the particular biochemical reaction. Thus, if a mutation makes the protein more rigid or flexible compared to the native structure, then it will affect the protein's function."

A very relevant scientific paper is the paper "Protein tolerance to random amino acid change." The authors describe an "x factor" which they define as "the probability that a random amino acid change will lead to a protein's inactivation." Based on their data and experimental work, they estimate this "x factor" to be 34%. It would be a big mistake to confuse this "x factor" with what percentage of a protein's amino acids could be changed without making the protein non-functional. An "x factor" of 34% actually suggests that *almost all* of a protein's amino acid sequence must exist in its current form for the protein to be functional.

Consider a protein with 375 amino acids (the median number of amino acids in humans). If you were to randomly substitute 4% of those amino acids (15 amino acids) with random amino acids, then (assuming this "x factor" is 34% as the scientists estimated), there would be only about 2 chances in 1000 that such replacements would not make the protein non-functional. The calculation is shown below (I used the Stat Trek binomial probability calculator). So the paper in question suggests protein molecules are extremely fine-tuned, fragile and sensitive to changes, and that more than 90% of a protein's amino acid sequence has to be in place before the molecule is functional.

Probability of success on a single trial	.34
Number of trials	15
Number of successes (x)	0
Binomial probability: P(X = x)	0.00196407937

Figure 1 of the paper here suggests something similar, by indicating that after about 10 random mutations, the fitness of a protein molecule will drop to zero.

Posted by Mark Mahin at 7:54 AM No comments:

Labels: evolution, natural selection, requirements underestimation

Monday, September 30, 2019

"Accidental Engineering" Sounds Goofy, So They Use the Term "Adaptions"

Humans have never observed a case of a very complex piece of engineering arising by accident. For example, we know of no cases of nice livable houses that arose from trees accidentally falling and forming into houses. We also know of no cases of trees accidentally falling to form into nice flat bridges. Occasionally a tree will fall in a way that provides a kind of bridge across a stream, but something so simple cannot really be called a case of accidental engineering. A fallen tree spanning a stream just resembles a fallen tree, not some feat of engineering.

Therefore, the phrase "accidental engineering" has a very implausible sound to it, rather like the phrase "accidental writing" or "accidental computer programming." But it is just such a concept of accidental engineering that our current biologists want us to believe in. They want us to believe that such accidental engineering occurred not just once or twice, but very many times, so many times that there were billions of cases of accidental engineering that explain all of the complex biological innovations discovered in the biological world.

Imagine if one of today's biologists were to explain such a dogma without using euphemisms. He might sound something like this:

"We should be glad that so very many cases of accidental engineering occurred to produce the parts of the human body. You can see things because of some accidental engineering that produced your eyes, and because of some very different accidental engineering that produced the parts of your brain involved in vision. You have a circulatory system because of entirely different cases of accidental engineering. Then there are the many cases of accidental engineering that conspired by chance to produce your skeletal system, and the many other cases of accidental engineering that randomly conspired to produce your intricate muscular system. On the molecular level, your body is made up of proteins, and there are more than 20,000 different types of proteins used by your body. Each of these types of protein molecules is like its own separate complex invention, a complex tiny machine or device with hundreds of amino acid parts fitting together in just the right way to produce a particular functional effect. So it seems that there were some 20,000 cases of very lucky accidental engineering that produced all of the protein molecules your body needs."

Such a statement sounds very far-fetched. So Darwinist biologists don't write statements like the statements above, although they believe exactly what is stated in the statement above. Instead, Darwinist biologists use a euphemism: the word "adaption." For example, a Darwinist biologist may tell you that your eyes are an adaption, and that your visual cortex

is an adaption, and that your nose is an adaption, and that your skeletal system is an adaption, and that your circulatory system is an adaption, and that your fingers and toes are adaptions.

Of course, the term "adaption" is about the least objectionable-sounding term you can use. Who can dispute that adaption occurs? Every day we see adaptions occurring around us. I hear on the TV that it's cold outside today, so I wear a jacket. That's an adaption. I taste my morning coffee, and find it's too hot. So I stir it. That's an adaption. Given that we see adaption occurring constantly around us, it's very unlikely that anyone will ever say something like "Adaptions are so rare." But when our biologists euphemistically use the word "adaption," what they are usually referring to are claims of accidental engineering, which is something so rare that humans have never observed it as it happened.

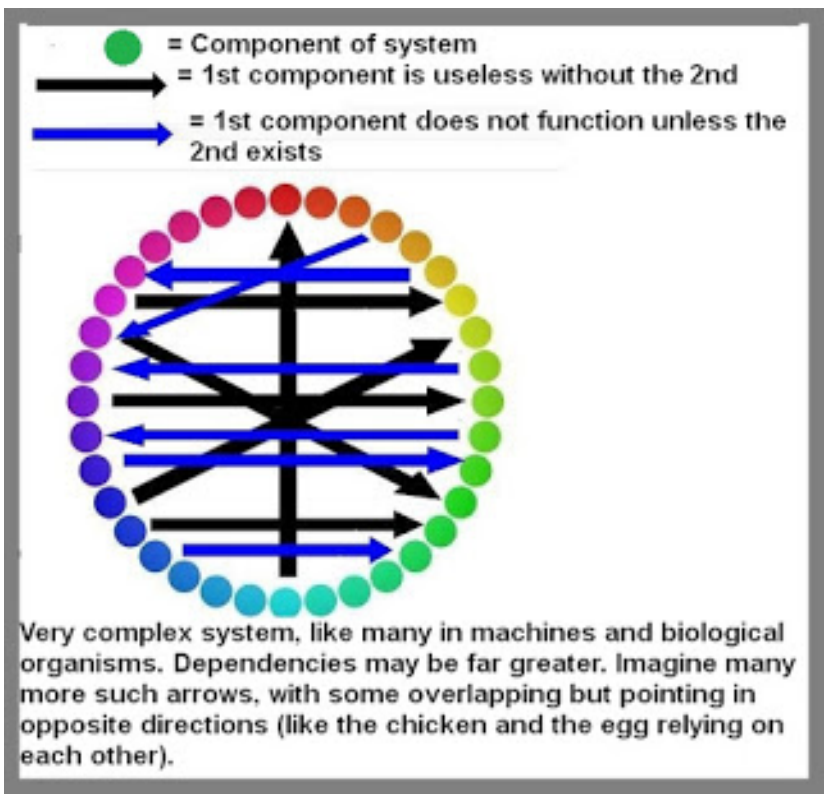
A dogmatic biologist using the term "adaption" for his claim of accidental engineering is somewhat like a person who wants you to believe that certain people have superpowers like in comic books, but who tries to make this sound like a not-unreasonable claim by using the euphemistic term "capability fluctuations" for his claim about superpowers.

EUPHEMISM	**MEANING**
“Friendly fire”	When a soldier from your army shoots or bombs other soldiers from your army
“Collateral damage”	When bombs dropped from military jets kill civilians unexpectedly
“Beginning a journey of self-discovery”	Fired
“Correctional facility”	Prison
“On an educational hiatus”	Dropped out of college
“Adaptions”	Complex biological innovations described as the results of accidental engineering

What is rather amusing is that the people who make these fanciful claims about accidental engineering are in general people who know nothing about engineering, and who never did any engineering. Their ignorance of the most basic principles of engineering is often obvious. Just as we can use a term such as "hydrodynamics know-nothing" to refer to someone like myself who knows nothing about hydrodynamics, it is in general true that Darwinist biologists are "engineering know-nothings," because they know nothing about engineering. It is rather

hilarious that such "engineering know-nothings" often insist that we should base our world-views on their engineering opinions, such as the opinion that wonderful cases of accidental engineering have occurred innumerable times.

Below we see a schematic diagram of a complex system like we find all over the place in biology, a system with so many interlocking dependencies that it seems impossible to imagine how it could have arisen accidentally. Such systems raise an abundance of "which came first, the chicken or the egg" problems, problems that our learned biologists ignore or sweep under the rug.



Examples of such biological things with interlocking dependencies include the many types of protein molecules that cannot fold correctly and cannot be functional unless there exist other types of helper protein molecules (called chaperone proteins). The source here estimates that 20 percent to 30 percent of protein molecules have a dependency on other chaperone proteins. When we do not consider the chaperone-dependency of such protein molecules, we might calculate a probability on the order of no more than about 1 in 10^{130} of the protein molecule appearing by chance from its component amino acids (since the gene for a protein molecule is typically a sequence of hundreds of amino acids, and such a sequence can be arranged in 10^{260} ways, almost all nonfunctional). When we then consider the dependency of such a molecule on one or more other equally complex molecules (a chaperone protein molecule), we must calculate a much, much smaller probability of the protein and its chaperones appearing, probably something as improbable as 1 chance in 10 to the two-hundredth power. We are asked to believe that such miracles of

chance (each an impressive example of accidental engineering) occurred not just once but billions of times, for there are billions of different types of protein molecules in the animal kingdom (the source here estimates 50 billion), and 20 percent of them require chaperone proteins. This is rather like believing in some planet where billions of people all live in houses that appeared accidentally, after many billions of falling trees conveniently formed into houses.

Posted by Mark Mahin at 7:43 AM No comments:

Labels: biology, Darwinism, evolution

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Sunday, August 18, 2019

He Tries to Play Natural History Mr. Fix-it

The book "Lamarck's Revenge" by paleontologist Peter Ward is a book that tries to kind of tell us: *evolution theory is broken, but there's a fix*. Unfortunately, the fix described is no real fix at all, being hardly better than a tiny little band-aid.

On page 43 the author tells us the following:

" 'Nature makes no leap,' meaning that evolution took place slowly and gradually. This was Darwin's core belief. And yet that is not how the fossil record works. The fossil record shows more 'leaps' than not in species."

On page 44 the author states the following:

"Charles Darwin, in edition after edition of his great masterpiece, railed against the fossil record. The problem was not his theory but the fossil record itself. Because of this, paleontology became an ever-greater embarrassment to the Keepers of Evolutionary Theory. By the 1940s and '50s this embarrassment only heightened. Yet data are data; it is the interpretation that changed. By the mid-twentieth century, the problem posed by fossils was so acute it could no longer be ignored: The fossil record, even with a century of collecting after Darwin, still did not support Darwinian views of how evolution took place. The greatest twentieth century paleontologist, George Gaylord Simpson, in midcentury had to admit to a reality of the fossil record: 'It remains true, as every paleontologist knows, that most new species, genera, and families, and that nearly all new categories above the level of families, appear in the record suddenly, and are not led up to by known, gradual, completely continuous transitional sequences.' "

So apparently the fossil record does not strongly support the claims of Darwin fans that new life forms appear mainly through slow, gradual evolution. Why have we not been told this important truth more often, and why have our authorities so often tried to insinuate that the opposite was true? An

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▶ April (8)
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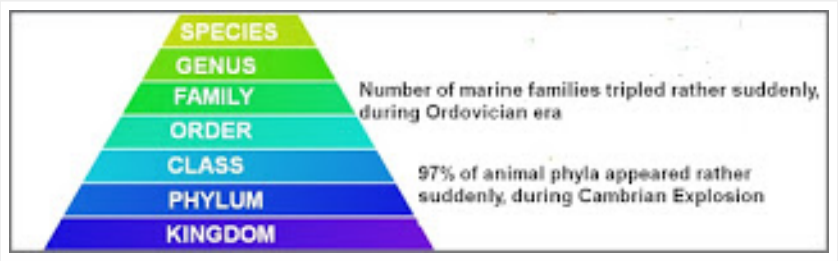
example is that during the Ordovician period, the number of marine animals in one classification category (Family, the category above Genus) tripled, increasing by 300% (according to this scientific paper). But such an "information explosion" is dwarfed by the organization bonanza that occurred during the Cambrian Explosion, in which almost all animal phyla appeared rather suddenly -- what we may call a gigantic complexity windfall.



Ward proposes a fix for the shortcomings of Darwinism – kind of a moldy old fix. He proposes that we go back and resurrect some of the ideas of the biologist Jean-Baptiste Lamarck, who died in 1829. Ward's zeal on this matter is immoderate, for on page 111 he refers to a critic of Darwinism and states, “The Deity he worships should be Lamarck, not God.” Many have accused evolutionary biologists of kind of putting Darwin on some pedestal of adulation, but here we seem to have this type of worshipful attitude directed towards a predecessor of Darwin.

Lamarck's most famous idea was that acquired characteristics can be inherited. He stated, "All that has been acquired, traced, or changed, in the physiology of individuals, during their life, is conserved...and transmitted to new individuals who are related to those who have undergone those changes." For more than a century, biologists told us that the biological theories of Lamarck are bunk. If the ideas of Lamarck are resurrected by biologists, this may show that biologists are very inconsistent thinkers who applaud in one decade what they condemned the previous decade.

Ward's attempt to patch up holes in Darwinism is based on epigenetics, which may offer some hope for a little bit of inheritance of acquired characteristics. In Chapter VII he discusses the huge problem of explaining the Cambrian Explosion, which he tells us is “when the major body plans of animals now on Earth appeared rapidly in the fossil record.” Ward promises us on page 111 that epigenetics can “explain away” the problem of the Cambrian Explosion. But he does nothing to fulfill this promise. On the same page he makes a statement that ends in absurdity:

“The...criticism is that Darwinian mechanisms, most notably natural selection combined with slow, gene-by-gene mutations, can in no way produce at the apparent speed at which the Cambrian explosion was able to produce all the

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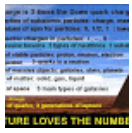
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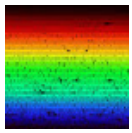
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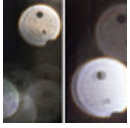
basic animal body plans in tens of millions of years or less. Yet the evidence of even faster evolutionary change is all around us. For example, the ways that weeds when invading a new environment can quickly change their shapes."

The latter half of this statement is fatuous. The mystery of the Cambrian Explosion was how so many dramatic biological innovations (such as vision, hard shells and locomotion) and how so many new animal body plans were able to appear so quickly. There is no biological innovation at all (and no real evolution) when masses of weeds change their shapes, just as there is no evolution when flocks of birds change their shapes; and weeds aren't even animals. The weeds still have the same DNA (the same genomes) that they had before they changed their shapes. Humans have never witnessed any type of natural biological innovation a thousandth as impressive as the Cambrian Explosion.

Ward then attempts to convince us that "four different epigenetic mechanisms presumably contributed to the great increase in both the kinds of species and the kinds of morphologies that distinguished them that together produced the Cambrian explosion" (page 113). By using the phrase "presumably contributed" he indicates he has no strong causal argument. To say something "contributed" to some effect is to make no strong causal claim at all. A million things may contribute to some effect without being anything close to being an actual cause of that effect. For example, the mass of my body contributes to the overall gravitational pull that the Earth and its inhabitants exert on the moon, but it is not true that the mass of my body is even one millionth of the reason why the moon keeps orbiting the Earth. And each time you have a little charcoal barbecue outside, you are contributing to global warming, but that does not mean your activity is even a millionth of the cause of global warming. So when a scientist merely says that one thing "contributes" to something else, he is not making a strong causal claim at at all. And when a scientist says that something "presumably contributed" to some effect, he is making a statement so featherweight and hesitant that it has no real weight.

On page 72-73 Ward has a section entitled "Summarizing Epigenetic Processes," and that section lists three things:

1. "Methlyation," that "lengths of DNA can be deactivated."
2. "Modifications of gene expression...such as increasing the rate of protein production called for by the code or slowing it down or even turning it on or off."
3. "Reprogramming," which he defines as some type of erasing, using the phrase "erase and erase again," also using the phrase "reprogramming, or erasing."



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- The Gigantic Missing Link of Biological Life

There is nothing constructive or creative in such epigenetic processes. They are simply little tweaks of existing proteins or genes, or cases of turning off or erasing parts of existing functionality. So epigenetics is useless in helping to explain how some vast burst of biological information and functional innovation (such as the Cambrian Explosion) could occur.

Trying to make it sound as if the idea that epigenetics had something to do with the Cambrian Explosion, Ward actually gives away that such an idea has not at all gained acceptance, for he states this on page 118: “From there the floodgates relating to epigenetics and the Cambrian explosion opened, yet none of this has made it into the textbooks thus far.” Of course, because there's no substance to the idea that epigenetics can explain even a hundredth of the Cambrian explosion. The Cambrian Explosion involved the relatively sudden appearance of almost all animal phyla, but Ward has failed to explain how epigenetics can explain the origin of even one of those phyla (or even a single appendage or organ or protein that appeared during the Cambrian Explosion). If the inheritance of acquired characteristics were true, it would do nothing to explain the appearance of novel biological innovations, never seen before, because the inheritance of acquired characteristics is the repetition of something some organisms already had, not the appearance of new traits, capabilities, or biological innovations.

So we have in Ward's book the strange situation of a book that mentions some big bleeding wounds in Darwinism, but then merely offers the tiniest band-aid as a fix, along with baseless boasts that sound like, “This fixes everything.”

A book like this seems like a complexity concealment. Everywhere living things show mountainous levels of organization, information and complexity, but you would never know that from reading Ward's book. He doesn't tell you that cells are so complex they are often compared to factories or cities. He doesn't tell you that in our bodies are more than 20,000 different types of protein molecules, each a different very complex arrangement of matter, each with the information complexity of a 50-line computer program, such proteins requiring a genome with an information complexity of 1000 books. He doesn't mention protein folding, one of the principal reasons why there is no credible explanation for the origin of proteins (the fact that functional proteins require folding, a very hard-to-achieve trick which can occur in less than .00000000000000000000000001 of the possible arrangements of the amino acids that make up a protein). In the index of the book we find no entries for "complexity," "organization," "order," or "information." Judging from its index, the book has only a passing reference to proteins, something that tells you nothing about them or how complex they are. The book doesn't even have an index entry for "cells,"

- Cosmic Fine-Tuning Visualized
- If Mankind Were To Perish, What Would Be Its Epitaph?
- Why Machines Will Not Soon Be as Intelligent as Men
- Cloud Computing and the Concept of Non-local Consciousness
- There Is No Plausible Explanation For How Brains Can Store Very Long-Term Memory
- The Top 6 Problems With Using a Multiverse to Explain Cosmic Fitness
- “Vacuum Catastrophe” Should Be Called the Vacuum Miracle
- Why the Origin of Humans Is an Unsolved Mystery

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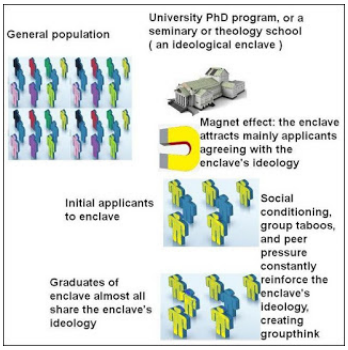
Featured Post

Why a Clique of Scientists Might Do Worse at Judging Truth Than a Jury

When newly awarded PhD's start writing papers and books and judging truth, they are rather like jurors who have been methodically expos...



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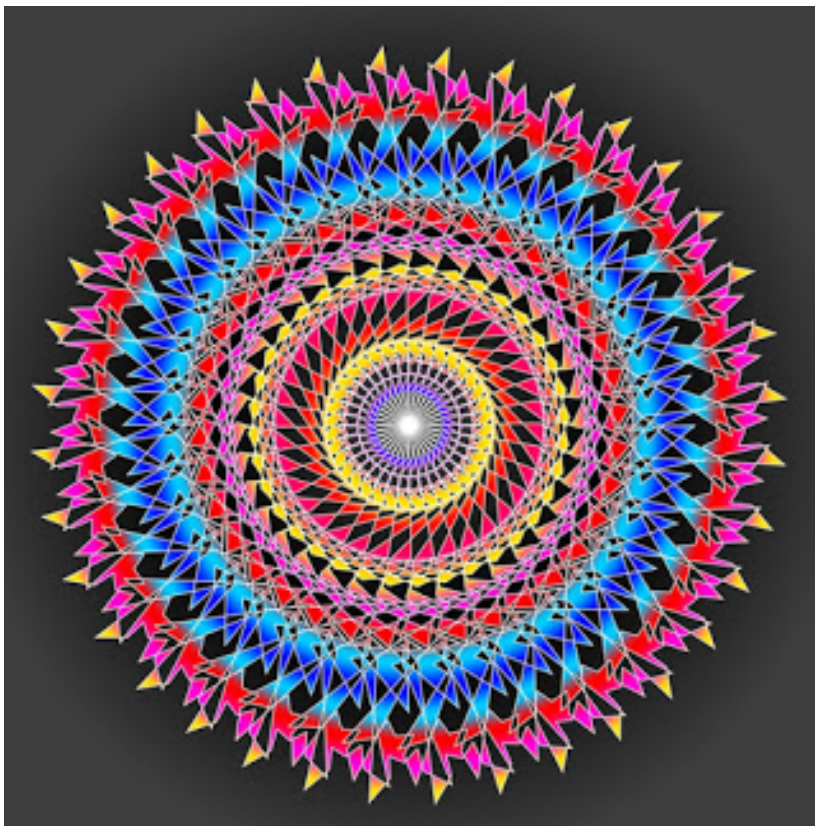
Labels

- 3D printing (1)
- abundance (1)
- acupuncture (1)

merely having an entry for "cellular differentiation." All that Ward tells you about the stratospheric level of order, organization and information in living things is when Ward tells you on page 97 that "there is no really simple life," and that life is "composed of a great number of atoms arranged in intricate ways," a statement so vague and nebulous that it will go in one of the reader's ears and out the other.

In his interesting recent book *Cosmological Koans*, which has some nice flourishes of literary style, the physicist Anthony Aquirre tells us about just how complex biological life is. He states the following on page 338:

"On the physical level, biological creatures are so much more complex in a functional way *than current artifacts of our technology that there's almost no comparison. The most elaborate and sophisticated human-designed machines, while quite impressive, are utter child's play compared with the workings of a cell: a cell contains on the order of 100 trillion atoms, and probably billions of quite complex molecules working with amazing precision. The most complex engineered machines -- modern jet aircraft, for example -- have several million parts. Thus, perhaps* all the jetliners in the world *(without people in them, of course) could compete in functional complexity with a lowly bacterium."*



Some arrangements are too complex to have appeared by chance

Posted by Mark Mahin at 7:31 AM No comments:

Labels: Cambrian Explosion, Darwinism, epigenetics, evolution, genetics, paleontology

Wednesday, June 5, 2019

Biological Orthodoxy Flunks the Software Test

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

Our biologists have long taught the doctrine of Darwinism, preaching that biological innovations appear because of random mutations and natural selection. But there has never been any good evidence that any complex macroscopic biological innovation ever appeared because of random mutations, natural selection, or any combination of the two. Referring to speciation (the origin of new species) in an interview, the distinguished biologist Denis Noble states, "So I go along with the view that there has been no really clear proof that speciation occurred via gradual mutation followed by selection." In the book *Evolution and Ecology: The Pace of Life* by Cambridge University biology professor K. D. Bennett, this mainstream authority comments on speciation (the origin of species). He says on page 175, "Natural selection has been shown to have occurred (for example, among populations of Darwin's finches), but there is no evidence that it accumulates over longer periods of time to produce speciation in the Darwinian sense."

But are there any experiments that back up the idea that random mutations and natural selection can produce very complex visible biological innovations? There are not. The plain fact is that never in human history have humans observed any very complex visible biological innovation naturally appearing, for any reason at all. There are various cases of weird mutations that have occurred because of exposure to radiation, but such mutations are almost always harmful, and we never see any new complex biological innovations appearing because of such mutations. Scientists have tried bombarding fruit flies with radiation for years, and no beneficial visible innovations ever appeared because of such a thing. The longest-running experiment on evolution is Richard Lenski's experiment, but that involves microscopic bacteria, and certainly is no evidence that visible biological innovation can occur because of Darwinian evolution. Very little has resulted from Lenski's experiment, and his main claim of innovation is merely that his bacteria can now kind of eat citrate. Such a biochemical tweak isn't anything very complex.

There is another way of testing Darwinian claims: by trying to create software that makes use of natural selection and random mutations, trying to achieve software engineering effects by "the preservation and accumulation of successive slight favorable variations," to quote Darwin. When computer programmers started to try this decades ago, some of them were very optimistic. There were quite a few people who thought along these lines:

"Why think of how much natural selection and random mutations have produced in the natural world: all the very complex innovations of biology such as eyes, ears, wings and brains! If we only put natural selection and random mutations to work inside the computer, we can unleash vast forces of

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

creativity. It will be a software revolution. Instead of manually creating programs through human design and human labor, we will be able to evolve software in a Darwinian fashion."

For decades, many programmers have attempted to get natural selection to work inside the computer. How successful have they been? We can find the answer in a recent paper by Roman V. Yampolskiy entitled 'Why We Do Not Evolve Software? Analysis of Evolutionary Algorithms."

Yampolskiy examines attempts to create software by using Darwinian methods. He points out that there is a great deal of hype about such attempts that does not match the meager results. Talking about evolutionary algorithms (EA), Yampolskiy states the following:

"It is interesting to do a thought experiments and try to imagine what testable predictions Charles Darwin would have made, had he made his discovery today, with full knowledge of modern bioinformatics and of computer science. His predictions may have included the following: (1) simulations of evolution will produce statistically similar results at least with respect to complexity of artifacts produced and (2) if running EAs for as long as possible continued to produce nontrivial outputs, scientists would run them forever. Likewise, he would be able to make some predictions, which would be able to falsify his theory, such as (1) representative simulations of evolution will not produce similar results to those observed in nature, (2) researchers will not be able to evolve software or other complex or novel artifacts, and (3) there will not be any projects running EAs long term because their outputs would quickly stop improving and stabilize. With respect to the public and general cultural knowledge, it would be reasonable to predict that educated people would know the longest-running EA and the most complex evolved algorithm. Similarly, even schoolchildren would know the most complex digital organism ever evolved."

Later, after reviewing work in this area, Yampolskiy states that both of the predictions that should have proven true if Darwinism is correct have not proven true. He also states that all of the listed events to falsify Darwinism have occurred. Specifically, representative simulations of evolution have not produced similar results to those observed in nature; researchers have not been able to evolve software or other complex or novel artifacts; and there have not been any projects running evolutionary algorithms long term. Moreover, no one can list the name of the longest-running evolutionary algorithm or the most complex evolutionary algorithm; and no one can name any complex digital organism that ever evolved.

It is now 2019 and the "Darwinian revolution" predicted for software development simply hasn't occurred. Computer

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

programs are still being produced by human design and human labor. There has been some progress in automatic programming by means of code generators, but such code generators don't use natural selection. The results of programs running "evolutionary algorithms" are rather trivial things that aren't very complex – things such as character strings. There is no very complex commercially successful computer program that was produced through any type of evolutionary algorithm. Computer program using a Darwinian scheme can accomplish some useful things, but it is generally true that such programs could accomplish just as much with fewer lines of code if they were not to use a Darwinian scheme. Our software engineers have not been able to mine any useful engineering principles from studying the ideas of Darwin, who seems to have had no knowledge of engineering or any interest in it.

There is another way of quickly judging whether evolutionary algorithms have been a very important player on the current software development scene. We can simply look at the computer science courses taught at major universities, and look for a substantial presence of courses on evolutionary algorithms. Such a thing will not be found. You can see here the catalog of 155 computer science courses taught at Columbia. None of them is a course on evolutionary algorithms or genetic programming. Similarly, none of the 60+ courses on computer science taught at SUNY Stony Brook is a course on evolutionary algorithms or genetic programming.

Yampolskiy considers some possible reasons why we still do not evolve computer programs by any kind of Darwinian process. None of his possible reasons is very persuasive, except for the last one he considers, that the "Darwinian algorithm is incomplete or wrong" and that "the inspiration behind evolutionary computation, the Darwinian algorithm itself is wrong or at least partially incomplete." Yampolskiy concludes, "Our analysis of relevant literature shows that no one has succeeded at evolving nontrivial software from scratch; in other words, the Darwinian algorithm works in theory but does not work in practice, when applied in the domain of software production."

This statement by Yampolskiy is mainly correct, although he errs in stating that the Darwinian algorithm "works in theory." To the contrary, we know of a very good theoretical reason why it should not work. The reason is that a random mutation is merely a micro-fragment of a biological innovation. A particular biological innovation typically requires multiple new proteins, and the gene for a typical protein requires 25,000 or more base pairs arranged in just the right way. A single point mutation changes or adds only one of those base pairs. So the relation of a random mutation and a biological innovation is like the relation between a random keystroke (or random character) and a

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

complex computer program consisting of 20,000 or more characters.

Since a mutation is merely a micro-fragment of a biological innovation, there is no way that nature could ever have a filtering effect by which complex innovations are produced because good mutations are accumulated. Such a thing is no more possible than writing a computer program that creates useful computer programs (or useful books or essays) by generating random characters and then "accumulating the good characters" while "discarding the bad characters."

The fact that biological orthodoxy has flunked the software test should not come as a surprise to anyone who considers how the actual process of producing complex innovations bears no resemblance to the imagined process by which Darwinian processes supposedly produce biological innovations. Our evolutionary biologists attempt to persuade us that very complex biological innovations appear because of an accumulation of countless tiny changes, each of which is individually rewarded. Nothing like that occurs when software teams produce complex new innovations. It is not at all true that software developers "release to production" each day's code changes, thinking, "Each little change I make in a work day will benefit the system."

Instead a new software release is always a very orchestrated affair in which many different code changes (almost always from different programmers) must be combined in a very coordinated way to produce a total effect that is beneficial, with

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

many complex interdependent parts being brought together (by an experienced software release coordinator) in just the right way to produce a benefit, often in a way so that multiple "chicken or the egg" mutually dependent dependencies are very carefully resolved. Darwinism has never credibly explained how such huge amounts of orchestration and coordination could be produced through natural selection, which is the mere fact that fit organisms reproduce more.

An example of biological functionality with mutually dependent dependencies is the cardiopulmonary system in mammals, and the related organs it depends on. Capillaries and veins and hemoglobin molecules are useless without hearts, which are useless without such things. Hearts also require oxygen from lungs. But the lungs require a constant flow of blood from the hearts. And the hearts won't keep beating steadily without the autonomic inputs of the brain, which itself requires the heart to keep it bathed in fresh blood. Also, the heart won't have energy without a digestive system, which itself requires constant blood from the heart. So it's "which came first, the chicken or the egg" mutually dependent dependencies all over the place, and we can imagine no credible sequence of gradual mutation-driven innovations by which such interdependent things could have originated.

Another example of such a "which came first, the chicken or the egg" problem has been pointed out by biochemist Michael Denton. After discussing in great detail various aspects of feathers, he states the following:

Every aspect of the feather's origin challenges Darwinian scenarios....Which came first: the cellular condensations that created the barb, or the apoptosis that separated them into discrete filaments? Only if both developmental processes are in place can the adaptive end of a branched feather be realized.

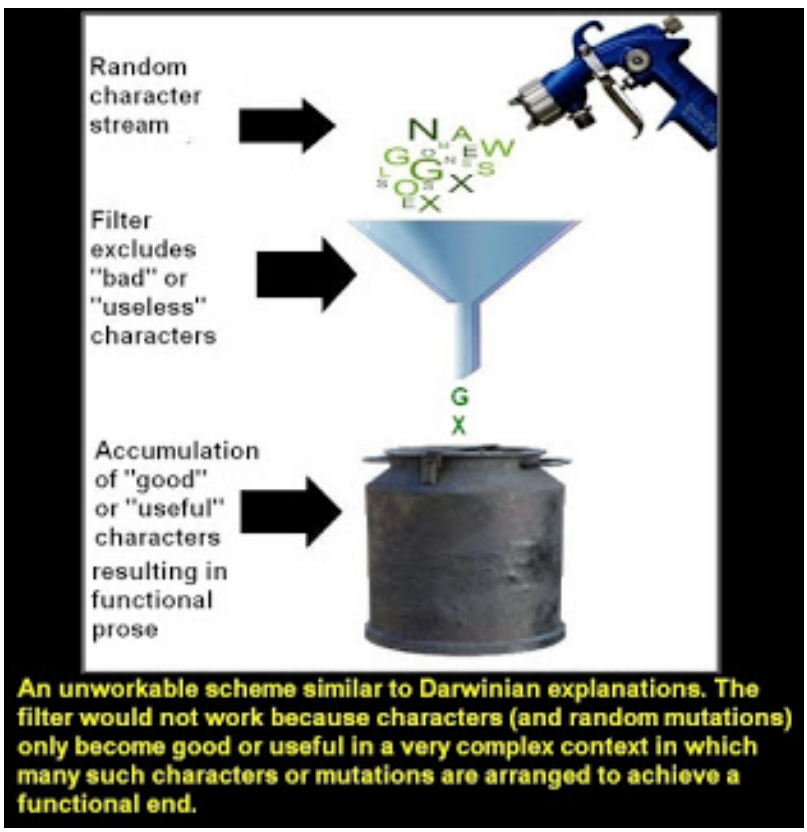
Denton also calls attention to the difficulty of explaining the origin of red blood cells that have no nucleus (called enucleate cells). He states this:

There is no known intermediate type of cell midway between the enucleate cell and the nucleated red cells of any other vertebrate species....Where there is an empirical absence of transitional forms, envisaging plausible hypothetical intermediates invariably proves impossible. And so it is here.

If we attempt to produce a Darwinian result using a computer, it may help to clarify a logical flaw in the Darwinian account of how complex things originate. Any competent computer programmer could create a function that provides a random stream of characters, producing output such as "ewqiqwe23023nsdagdsogsd" or "gsdib9witb3252bfeyery"

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

every second. Now let us suppose that we try to use such a stream of random characters to produce useful works such as essays, blog posts, and computer programs. Following Darwinian ideas, and the frequent suggestion in Darwin's writings that biological innovations are produced by accumulations of favorable random changes, we will try to do this by "accumulating the good stuff" and "discarding the bad stuff." Will this work to produce useful works such as essays, blog posts, and computer programs? It certainly will not. It also will not work to create a stream of random words (randomly getting a line from a list of 100,000 words), and then following a principle of "accumulating the good stuff" and "discarding the bad stuff," or a principle of "accumulating the useful stuff and discarding the useless stuff."



An unworkable scheme similar to Darwinian explanations. The filter would not work because characters (and random mutations) only become good or useful in a very complex context in which many such characters or mutations are arranged to achieve a functional end.

Why will such an attempt always fail? It's because at the character level and at the word level there is no way to distinguish between something good or bad, or something useful or not useful. All characters are equally useful, and all common words are equally useful. So at the low level of individual characters and individual words, there is no way to apply any "survival of the fittest" or any filtering effect which allows "good letters" to accumulate into good literary works, or "good words" to accumulate into good essays or good computer programs. Similarly, since a random mutation is only the tiniest fraction of a biological innovation (such as a millionth), without any intrinsic property of being good or useful in the sense of providing a survival benefit, there is no way for nature to produce complex biological innovations by "accumulating the good mutations" and "discarding the bad mutations."

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

But it is rather easy to think otherwise. You might reason: if some biological innovation is useful (in the sense of producing a survival benefit), and the innovation is caused by 100,000 little point mutations, are not each of those mutations also useful? But to think that is to commit a fallacy called the fallacy of division, the fallacy of assuming that parts of a whole must have some property of the whole. The parts of a whole do not necessarily have some property possessed by the whole. For example, while a college textbook is heavy, individual pages of that book are not heavy.

If we commit the fallacy of division, we may reason that since some useful biological innovation built from 100,000 mutations is useful (in the sense of providing a survival benefit), therefore the individual mutations that built it are also useful in providing a survival benefit, and that nature can accumulate such mutations by "saving the useful mutations" and "discarding the useless mutations." But after more careful thinking we realize that such a thing cannot occur, because the individual mutations do not have any property of being useful in the sense of providing a survival benefit, and such usefulness only arises late-in-the-game from incredibly complex and hard-to-achieve combinations of very many such mutations, combinations that are incredibly unlikely to occur by chance. A principle of "good stuff piles up" works for the owners of ski lodges hoping to explain how they got nice snow accumulations, but such a principle is basically worthless for explaining the origin of cars, bridges, computers, ships, and complex biological innovations.

Posted by Mark Mahin at 9:34 AM No comments:

Labels: Darwinism, evolution, natural selection

Thursday, May 9, 2019

12+ Belief Options Regarding the Origin of Species

Imagine a realtor shows you an apartment for rent. The rent is way too high, and the apartment has a leaky roof, and lots of roaches running about. As you leave the apartment with the realtor, the realtor tries to get you to rent the apartment by saying, “Look, you may not like it, but you have a choice: either rent it, or get used to sleeping out on the cold street.” Such an argument commits the fallacy of a false dilemma, in which someone speaks as if there are only two choices, even though there are a variety of choices. Of course, a renter will almost always have a choice of several different apartments he can rent.

A similar false dilemma is very frequently presented by Darwinists who speak as if we have a choice in believing in orthodox Darwinism or believing in biblical creationism, the idea that all of the earth's species were created only a few thousand years ago. The range of choices is not at all so narrow. Instead of having just two choices in regard to what we can believe about the origin of species, you actually

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

have quite a few belief options you can choose from. In this post I will describe thirteen such choices.

Background: The Fossil Record

The fossil record presents certain constraints on any theory of the origin of species that follows the principle of, "Let's believe the past was as it appears to have been." But as we will see this constraint is not absolute, because under certain imaginative theories such a principle might actually be dispensed with.

A Darwinist will inevitably describe the fossil record as showing evidence of gradual evolution. But described in the most lean and objective way, that is not necessarily so. What the fossil record does seem to show is very strong evidence that species have appeared at scattered times during the past 600 million years.

The animal kingdom contains about 36 major divisions called phyla. Contrary to what we might expect under Darwinian assumptions, we do not see most of these phyla appearing during the past 200 million years, in some kind of "cone of increasing diversity." Instead, most of the animal phyla appear between 600 and 500 million years ago, with no animal phylum appearing after about 500 million years ago.

Option #1: Darwinism

There are three tenets of orthodox Darwinism. The first is the belief that all life has descended from a common primitive ancestor. The second is gradualism, the idea that species arise because one species slowly evolves into another species. The third tenet of Darwinism is the idea that new species appear mainly because of random changes or random mutations and natural selection.

There are problems with Darwinism. The first is that we have no direct observational evidence that any of its three main ideas is correct. While we have evidence that species appeared at different intervals during the past 600 million years, this does not prove that such species evolved from earlier ancestors. Such species might have been dropped off by visiting spaceships, or created by some divine creator (to mention two of quite a few possibilities I will discuss). While there is evidence that natural selection can produce microevolution (typically a kind of pruning effect getting rid of unfit members of a population), there is no good evidence that an accumulation of small changes produced by natural selection will result in a new species or a macroscopic biological innovation. What we see in organisms is gigantic amounts of organization, but natural selection is not actually a theory of organization; it's merely a theory of accumulation (that being the word that Darwin used again and again in describing his theory).

A very large objection against the idea of evolution by natural selection is that it cannot explain the early stages (or incipient stages) of any new biological organ, biological system, or biological

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

innovation. Such early stages would almost always fail to produce any reward, so we would not expect that natural selection would cause them to proliferate because of "survival of the fittest." An additional problem is that Darwinism offers no answer to the origin of life itself, something that cannot be explained by natural selection (which requires life to first exist).

Option #2: "Third Way" Naturalistic Gradualism

The term "third way" has sometimes been used for the idea that species appear through blind gradual evolution, but that this does not occur mainly because of natural selection. A person following this approach may believe that gradual evolution requires some much more complicated explanation than the simplistic explanation of random mutations and natural selection. The person may appeal to some imagined natural principle of self-organization. Or the person may appeal to ideas such as DNA methlyzation, gene swapping, or epigenetics. There is a web site listing various scientists who take such an approach. You could put under this category a theory such as the neutral theory of evolution.

Option #3: Biblical Creationism

Biblical creationism is the idea that species appeared all at once, after being created by a divine creator, as described by the Bible. When combined with fundamentalism, biblical creationism typically holds that all species are no older than a few thousand years. The principle problem with this option is that it conflicts with the fossil record, which suggests that species have appeared over a span of many millions of years.

I may note that it is an error to use the term "creationist" to refer to anyone who has not stated that he believes in the biblical account of creation, because when you do a Google search for "creationism" the first definition you will get is one that specifically refers to the biblical account of creation. This error of calling critics of Darwinism "creationists" is very often used in a dishonest way by Darwinism zealots, who will call any critic of Darwinism a creationist even when such a person has not identified himself as a believer in the biblical view of creation. Such critics are properly referred to as "Darwinism skeptics."

Option #4: Intelligent Design

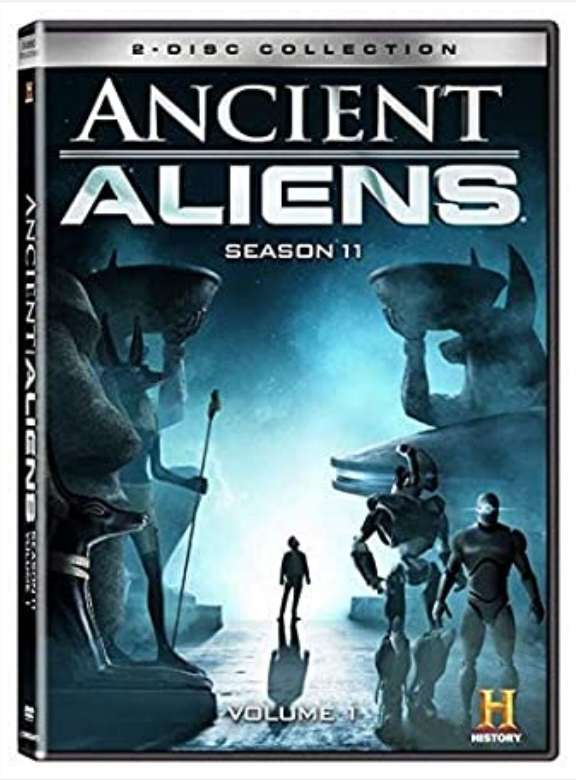
Intelligent design may be very generally described as the idea that species have appeared after design activity from some intelligent designer. The term is actually a broad umbrella that covers quite a few diverse possibilities. A person believing in intelligent design may or may not believe that the earth's species are descended from a common ancestor, and may or may not believe in gradualism, the idea that one species gradually evolves into another. Typically a person believing in intelligent design will believe that some divine agent is the intelligent designer, although some believers in intelligent design say that the

nature of the designer cannot be known (perhaps leaving the door open to some extraterrestrial agent as the intelligent designer).

Option #5: Origin of Species by Extraterrestrial Actions

The term *panspermia* is used for a theory that life originated on Earth after it came here from space, possibly by comets. The term *directed panspermia* is sometimes used for the idea that life originated on Earth after some spaceship came here and dropped off microorganisms. There is no reason why speculations about extraterrestrial involvement in earthly biology be confined to the origin of life. We can take things further, and speculate that all, most or some species now existing have originated because of extraterrestrial actions. The appearances of species we see in the fossil record could have been mostly caused by extraterrestrial spaceships that dropped off biological organisms on our planet. Or perhaps only some of the most hard-to-explain species have originated after extraterrestrial intervention, including our own species.

This Option #5 has often been suggested by the popular television show *Ancient Aliens*, which often suggests that the seemingly sudden appearance of human culture may have been the result of tinkering by extraterrestrials.



It's not just a theory, it's a TV series

The advantage of believing in Option 5 is that it can reduce some of the huge improbability problems associated with Darwinism. There are reasons for thinking that the chance of a species such as mankind ever appearing because of random Darwinian evolution is less than 1 in a billion. But let us imagine 100 billion habitable planets in our galaxy. The chance of an intelligent species on at least one of those planets might have been much better than 1 in a billion. And then such an intelligent life form might have caused intelligent life to appear on

our planet. Under such a theory, the implausible improbability may be reduced substantially.

Option #6: Teleological Gradualism

The term gradualism refers to the idea that biological species have gradually evolved from other species. One can believe in such an idea without believing that natural selection or random mutations are sufficient to explain why one species would evolve into another species. An alternate idea is that there is some kind of cosmic impetus or life-force that drives species towards higher levels of organization and complexity. We might think of this in a rather mystical or vitalistic sense. Or we might think of such a thing as being a kind of cosmic programming.

It is interesting to note that a divine agent would not necessarily cause species to come into existence through some special intervention. Such an agent might create subtle laws and cosmic algorithms that might cause life to appear and start becoming more and more organized across the universe. Much of this “cosmic programming” might be undiscovered by us.

One can believe in such a thing while also maintaining that natural selection is utterly inadequate to explain biological complexity.

Option #7: Origins Agnosticism

The term agnosticism refers to taking no position on whether or not a deity exists. The term “origins agnosticism” can be used for the stance of taking no position as to how biological species arose. An origins agnostic does not maintain that species arose because of Darwinian evolution by natural selection, does not maintain that species through any gradual process of evolution, does not maintain that species arose because of some special creation, and does not maintain that species arose because of some form of intelligent design. The origins agnostic simply answers, “I don't understand such matters,” or “No one understands such matters” when asked about such topics.

Given the limits of human knowledge and understanding, a strong case can be made that origins agnosticism is actually the most scientific stance that can currently be taken on the issue of the origin of species.

Option #8: Philosophical Immaterialism

Most people take the fossil record and the geological record as something that force us without any flexibility to believe that the physical universe existed for billions of years before man appeared on the scene. But under certain philosophical assumptions, such a thing is not necessarily so.

One interesting philosophical theory, surprisingly easy to defend, is known as idealism or immaterialism. This is the idea that all that exists are minds or mental experiences, and that matter exists only as

something within the perceptions of mental agents, having no reality outside of the perceptions or experiences of minds. Under such a theory, what is called the first four billion years of earth's history undergoes a kind of demotion, becoming something that exists purely as a perceptual detail or conceptual detail. An immaterialist may believe that the history of planet Earth really started when the first humans existed, and first had mental experiences.

To help get a handle on such an idea, consider a newly created video game. The initial level of play may involve acting as Detective Waterson in the detective's living room, with the calendar listing January 1, 1890 as the date. Inside that living room may be a scrapbook showing events from Detective's Waterson's childhood, going back to 1860. But that scrapbook is just kind of what screenwriters call "back story." The game doesn't really begin in 1860 – it begins in 1890, with the first day of the player's experience playing Detective Waterson. Similarly, what we call the Jurassic Era and the Triassic Era may be mere "back story." The history of earth – which actually may be just a history of mental experiences – may have begun only when the first mental experiences occurred. Under such a theory, it may be denied that there ever really existed creatures such as dinosaurs, which may be merely part of a narrative "back story," and which may be called never-existent because no real mind ever perceived them.

Under such a doctrine of immaterialism, we may need to postulate some non-human mental reality as being the source of human mental reality. Under an immaterialist perspective, all attempts to postulate physical or biological causes for the origin of humanity are mistaken. The thinking goes along the lines of: we are purely mental, and the cause of us must also be purely mental.

Option #9: The Idea Our Planet Is a Technological Simulation

The idea has been widely discussed that we may be part of a computer simulation created by extraterrestrials. Under such a theory, we remove biological evolution as the cause of humanity, and replace such an idea with the idea that extraterrestrial programmers are the cause of humanity.

This idea has many difficulties. One is that it kind of pushes off into the far horizon the question of how minds could ever originally appear. If we are the result of extraterrestrial programming, then any evidence claimed for evolution disappears, becoming just "part of the illusion" or "part of the simulation." So we are then left with the question: how could these extraterrestrials that programmed our simulation ever have appeared? You can't cite evolution if your assumption has made earthly evolution just "part of the simulation."

Option #10: Hyper-Dimensional Migration of Species

Modern science fiction often talks about space-time wormholes, allowing an instantaneous passage from one part of space to another

part of space. Such a concept is higher speculative. Engaging in similar speculations, we may postulate that reality may consist of numerous different dimensions or universes, and there may be portals or wormholes that allow transit from one dimension or universe to another.

Such a possibility may suggest a strange theory about the origin of species. The theory is that many, most or all species have originated in some other universe or other dimension, and have somehow migrated to our planet, after some organisms passed through some wormhole or portal. There might be some reason why such a wormhole or portal might open up very rarely, perhaps only once every few million years.

A disadvantage of such a theory is that it kind of pushes off to the horizon the ultimate reason as to why species originated, since no explanation is provided as to how they might have originated in some other dimension or other universe.

Option #11: Cosmic Learning

A problem with Darwinism is that it asks us to believe in occurrences that seem all-too-unlikely to have occurred given only the non-creative and non-organizational factors of natural selection and random mutations. But let us imagine something that might increase the chance of natural evolution. We can imagine that the universe somehow has a mysterious ability to learn and remember when incredibly improbable fortunate things happen. So imagine billions of galaxies each containing billions of planets. There might be only 1 chance in 1,000,000,000,000,000,000,000,000 that a particular biological innovation would anywhere in the universe. But once that biological innovation had occurred, this might somehow be like some trick that the whole universe had learned. The odds of such an event might then suddenly decrease, going from 1 chance in 1,000,000,000,000,000,000,000,000 to something like 1 chance in 100. Then we might suddenly see that biological innovation occurring with great ease all over the universe.

I have no idea of how such “cosmic learning” might work, but conceivably some theorist might flesh out this vague suggestion. One possibility might be to imagine that the universe itself has a kind of mind, to some degree.

Option 12: Biological Innovations from Unknown Previous Earthly Civilizations

An interesting rarely considered possibility is that our civilization may not be the first high-technology civilization to arise on our planet. It could be that many millions of years ago some technical civilization arose on our planet. Almost all traces of such a civilization could have been lost because of geological activity. If an earlier civilization had existed on Earth, it might have engaged in genetic engineering, creating new forms of life. Some of the species that now exist may have been created by such a civilization.

Option 13: The Origin of Species by Less-Than-Divine Spiritual Entities

Yet another possibility is that one or more species (possibly mankind) were created not by the creator of the universe, but by some poorly understood spiritual entities of lesser power. Possibilities include angels, demons or any other hypothetical spiritual entities such as mysterious disembodied spirits. Appealing to such a possibility may have the advantage that it defeats all arguments along the lines that an omnipotent power would not have created creatures so flawed as humans are. If humans were created by less-than-divine spiritual entities, we can draw no conclusions about whether the creations of such entities would be perfect.

Conclusion

We have seen that there are many possible belief options regarding the origin of species. I have listed thirteen, and some more imaginative thinker could probably add five or ten more.

There is another factor to consider, which expands the possibility set further. This is the fact that few of these possibilities are mutually exclusive. It is possible that multiple causal factors were involved in the origin of species, and that some species appeared for one reason, and other species appeared for others. For example, it could be that all earthly species arose for some particular reason, and that humanity (with so many unique characteristics) arose because of some very different reason. When we consider the possibility that species may appear because of a combination of two or more of the 13 items I have listed here, then the total set of belief possibilities would seem to be in excess of 25.

Postscript: A Yale professor of computer science has written this recent essay arguing against Darwinist explanations of the origin of species. His two main points are the failure of Darwinism to explain the dramatic burst of biological innovation in the Cambrian Explosion (in which most animal phyla originated), and the failure of Darwinism as an explanation for fine-tuned proteins incredibly unlikely to originate through random mutations and natural selection.

Posted by Mark Mahin at 11:22 AM 2 comments:

Labels: Darwinism, evolution, natural selection, origin of man

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Why the Origin of Humans Is an Unsolved Mystery

We have good evidence from art in early human caves that the human species is older than 40,000 years. But the earliest past of humanity is very murky indeed. For decades scientists have been dogmatically speaking as if they understand the origin of the human race. We are

told that this occurred when man evolved from more primitive ancestors with smaller brains, through a Darwinian process of natural selection and random mutations. But the evidence cited for such claims has always been weak.

The first widely-read sales pitch for the idea that man has evolved from lower species was presented by Charles Darwin in *The Descent of Man, and Selection in Regard to Sex*. In Chapter XX1 of that book, entitled "General Summary and Conclusion," Darwin summarized his case that man had evolved from lower forms. He presented only an extremely weak set of reasons, but dogmatically declared them to be decisive evidence. He appealed mainly to embryology and structural similarities between man and animals. He stated we are "forced to admit that the close resemblance of the embryo of man to that, for instance, of a dog – the construction of his skull, limbs, and whole frame, independently of the uses to which the parts may be put, on the same plan with that of other mammals – the occasional reappearance of various structures, for instance of several distinct muscles, which man does not normally possess, but which are common to the Quadrumana ---and a crowd of analogous facts – all point in the plainest manner to the conclusion that man is the co-descendant with other mammals of a common progenitor."

This was all an extremely weak case. It was not at all clear that we should assume humans and dogs have a common ancestor because of a similarity of embryos, nor was it clear that a rough structural similarity of anthropoid bones should cause us to think that men have evolved from an apelike ancestor (particularly given that the skulls of other species look different from human skulls). The meager items mentioned by Darwin in his summary did not by any means "point in the plainest manner to the conclusion that man is the co-descendant with other mammals of a common progenitor."

But today's evolutionary biologist would claim that the modern case for human evolution is much better, because of fossil evidence. We are told that paleontologists have found a series of fossils belonging to creatures with brains midway between the size of a human brain and the size of a chimpanzee brain.

But there is a reason why such fossils do not by themselves establish any claim of lineage or ancestry. The reason is that quite possibly there existed during the past 5 million years a variety of anthropoid species which were not ancestors of the human species; and in such case there would have been the same fossil record that we have discovered, even if mankind did not evolve from any of those species.

Imagine if the human race were to travel to a distant planet, and intervene in that planet's biosphere, introducing a human-like species (call it species Z) to the planet. Suppose that on the planet there existed from 3 million BC to 300,000 BC a species (call it Species X) with 50% of the human brain size, and that from 1 million BC to 100,000 BC there existed still another species (call it Species Y) with 75% of human brain size. Then 100,000 years after this human

intervention, descendants of the organisms introduced by humans might be able to make a "Chart of Evolution" looking like this:

Time	**Species**	**Brain Size (Compared to Us)**
1,000,000 years ago	Species X	50.00%
500,000 years ago	Species Y	75.00%
Present	Our species (Species Z)	100.00%

Such a chart could be presented as a "Chart of Evolution" suggesting a progression from Species X to Species Y, and then a progression from Species Y to Species Z. But there would not actually have been such a progression. In fact, in this case there is no ancestry at all between any of these species.

That's an example of how "Charts of Evolution" can be made by cherry-picking data, and arranging them in a linear sequence to encourage people to believe in a progression that did not actually occur. Here is another example. Imagine you go to the Columbia University library, and find some old university yearbooks. You could choose from 1970 a picture of a short, very fat student. Then from from 1980 you could choose a picture of a slightly short, slightly fat student. Then from 1990 you could choose a picture of a student of average weight and height. Then from 2000 you could choose a student of a rather tall and slightly muscular student. Then from 2015 you could choose a picture of a tall and very muscular student looking like a football tight end. You could then arrange these pictures chronologically in a series you might entitle "Evolution of the Columbia Student." Such a series would give someone the completely erroneous idea that students at Columbia have evolved from being very fat and short to being tall and muscular. But such a chart would be very misleading.

Such examples should make us pretty suspicious of the standard "Chart of Evolution" showing some ape-like species evolving over millions of years to become man. Such charts don't show the likelihood of such a progression, but merely show the possibility of such a progression. We may become more doubtful when we consider that visual representations of past species are largely speculative. Fossils of claimed human ancestors are all fragmentary. An example is the famous Lucy skeleton, where we have but a few small pieces of a skull and some other small bone fragments. We see charts listing the brain sizes of organisms corresponding to such fossils, but the numbers in such charts are guesswork, since we don't have any fossilized brains. We may wonder whether the numbers supplied in such charts are numbers arbitrarily chosen to fit in with orthodox assumptions about evolutionary transitions. We should remember that almost every account of fossil evidence coming from orthodox biologists, paleontologists and anthropologists is likely to be biased, slanted and speculative, because such scientists (trained in ideological

enclaves resembling seminaries) are tribal conformists peer-pressured into peddling a particular Darwinist belief system based on the assumption that humans descended from lower species.

But is there some evidence that might make ideas of human ancestry better founded? In theory, there could be: DNA evidence. If you were able to have complete DNA that corresponded to each of the fossils in a fossil series, you would be on much firmer ground drawing conclusions about ancestry.

But in this case our paleontologists do not have what they would like to have. This is one of the dirty little secrets of modern evolutionary biology. Our evolutionary biologists do not have the DNA evidence they need to solidify the claims they make about human origins. The problem is that regular organic material rots in less than a few thousand years, and you can't get much DNA from a very old fossil bone. The half-life of DNA is 521 years. So we don't have any adequate DNA evidence from *Homo erectu*s or *Homo habilis*, which are claimed to be ancestors or evolutionary cousins of the human species. The oldest DNA from a claimed human ancestor is a scrap of DNA dating back 400,000 years. But this is only about 16,000 base pairs, and the human genome is 3.2 billion base pairs. Such a tiny scrap doesn't give you a hundredth of what you would need to genetically verify that such an organism was an ancestor of humans.

Imagine a trial in which the prosecution needed some blood photographed at a crime scene corresponding to the blood of the person being tried. But imagine the blood was washed away before its DNA was checked, so no DNA match was made. That's the kind of position our evolutionary biologist is in. He really needs some complete *Homo erectus* DNA or *Homo habilis DNA* to back up his claims that these are human ancestors. But no such DNA exists, merely a rare scrap here and there. Some scientists try to use mitochondrial DNA obtained from fossils, but no reliable conclusions can be drawn from such DNA (mitochondrial DNA has less than 1% of the genetic material found in regular DNA).

We do have the complete DNA of modern humans and modern chimpanzees, and some argue that the similarity between these two implies that both had a common evolutionary ancestor. It is claimed that the protein-coding part of the human genome is 96% similar to the protein-coding part of the chimpanzee genome. But this refers to merely the building materials of proteins (amino acids), and is not based on a comparison of the full protein, which has a 3D shape. No one knows for sure how proteins get their 3D shapes. This is the long-standing protein folding problem discussed in these three posts. When you look at the full protein including its shape, not just the amino acid building blocks specified in DNA, it turns out that chimpanzees and humans are not so similar. The scientific paper here is entitled “Eighty percent of proteins are different between humans and chimpanzees.”

In 2017 bbc.com had a long article entitled “We have still not found the missing link between us and apes.” The article discusses the

history of postulating a common ancestor linking current ape-like animals and humans. What we get is a story of a great deal of disagreement and changes in the prevailing narrative. Referring to a "last common ancestor" or LCA, we are told, “Surprisingly, the last 15 years has actually seen popular opinion begin to swing away from the idea of a chimp-like LCA, and towards a model closer to that argued by people like Strauss in the 1940s.” Of one analysis, we are told, “One of the implications of their interpretations was that all sorts of anatomical features shared by gibbons, orangutans, chimps and gorillas must have evolved independently in each of these apes.” That claim should raise suspicions, as such coincidental independent evolution is highly improbable.

The article says the following about a Last Common Ancestor:

"There has been a community shift, where people have begun to question what was an emerging consensus for a chimp-like LCA," says Young. But even that is not the end of the story. There are still "chimp-like LCA" advocates out there, and they are fighting back...Of course, only if and when fossils of the LCA itself come to light will the debate finally draw to a close.....It is possible, they say, that the LCA might actually have lived 13 – not seven – million years ago....There are also a few researchers who take a completely different view. For instance, Schwartz is adamant that it is orangutans, not chimpanzees, that are our sister species."

A scientific article tells us, “Few fields of research are subject to so many competing hypotheses, as illustrated by the variable number of ancestral species assigned to the human lineage by different authors, ranging from four to a maximum of 25.” Such gaps and disagreements should not at all inspire our confidence that scientists have a firm gasp on this matter. The scientists are apparently fighting among themselves, disagreeing about the most basic things, and missing many of the fossils they need.

Scientists cannot find fossil evidence of a last common ancestor between chimps and humans, as they indicate by their frequent claims that chimps and humans share a common ancestor without specifying what that ancestor was. The wikipedia.org article on "Chimpanzee-human last common ancestor" (CHLCA) confesses, "no fossil has yet been identified as a probable candidate for the CHLCA." Another major missing link is a common ancestor between humans and Neanderthals. Using the term “LCA” to mean “last common ancestor,” a mainstream scientific paper states the following striking confession:

We still do not have a good fossil candidate for the phenotypic LCA of Neanderthals and modern humans. This result is striking because confidence intervals of ancestral

reconstructions are very broad, which means that existing candidates are very incompatible.

If I do a Google image search for "human evolution tree," I see various charts trying to put fossils into a tree of human evolution. But the charts are speculative. The recent book "Almost Human" by two paleontologists (Berger and Hawks) tacitly admits this, for in its chart of hominid evolution, we see four nodes that have question marks, indicating hypothetical ancestors that have not been found. According to the "human evolution" chart in that recent book (which can be seen on this page):

(1) We have not found a common ancestor between Neanderthals and humans (that ancestor, which we can call Missing Link 1 is represented in the chart as a question mark).
(2) We have not found a common ancestor between this Missing Link 1, *Homo erectus* and *Homo florensis* (that ancestor, which we can call Missing Link 2, is represented in the chart as a question mark).
(3) We have not found a common ancestor between this Missing Link 2, *Homo rudolfensis, Homo habilis* and *Australopithecus sediba* (that ancestor, which we can call Missing Link 3, is represented in the chart as a question mark).
(4) We have not found a common ancestor between this Missing Link 3, *Australopithecus africanus*, and *Australopithecus afarensis* (that ancestor, which we can call Missing Link 4, is represented in the chart as a question mark).

Each of these four missing links, according to the paleontologist's chart in this book, are in the direct path of human ancestry, and none of them are missing links in side detours. But is it really believable that we would be lacking in fossils for *four* different species that are human ancestors in the past few million years?

There is also inconsistency in these charts. Some of these charts list *Australopithicus africanus* as a direct ancestor of humans, while the "Almost Human" chart does not list *Australopithicus africanus* as a direct ancestor of humans. Some of these charts list *Homo erectus* as a direct ancestor of humans, while others indicate *Homo erectus* was not a direct ancestor of humans.

Dogmatic theorists often try to kind of "prove things with language" by referring to species such as *Homo erectus* as humans. Such language is erroneous. It is illegitimate to use the word "human" to refer to any species which did not show evidence of language or symbolic activity, and such alleged human predecessors as *Homo erectus* did not show such a thing. Art and symbolic activity appeared rather suddenly about 50,000 - 70,000 years ago. As for the habit of grouping mankind with other species in a genus called *Homo*, it is merely an arbitrary and dubious classification choice, particularly now that there is such a physically diverse group of species put in that genus, with brain sizes varying by 300% (for example, *Homo*

floresiensis had a brain size only a third as big as humans).

The most plausible fossil candidate for a human ancestor is not the Neanderthals (whose existence substantially overlapped with the existence of early humans), but a species referred to as *Homo heidelbergensis*. But the wikipedia.org article on *Homo heidelbergensis* tells us that the case for such an ancestry is far from clear. It states the following:

"Homo sapiens *has been proposed as derived from* H. heidelbergensis *via* Homo rhodesiensis*, present in East and North Africa from around 400,000 years ago. The correct assignment of many fossils to a particular chronospecies is difficult and often differences in opinion ensue among paleoanthropologists due to the absence of universally accepted dividing lines (autapomorphies) between* Homo erectus*,* Homo heidelbergensis*,* Homo rhodesiensis *and Neanderthals. It is uncertain whether* H. heidelbergensis *is ancestral to* Homo sapiens*, as a fossil gap in Africa between 400,000 and 260,000 years ago obscures the presumed derivation of* H. sapiens *from* H. rhodesiensis*....The delineation between early* H. heidelbergensis *and* H. erectus *is also unclear. Given the evidence, it means there is no direct evidence that suggest the* Homo heidelbergensis *is related to modern-day humans."*

Such a statement should shock every person who believes that humans are descended from more ape-like ancestors. The statement tells us that there is "no direct evidence" that this best candidate for a human ancestor is related to modern-day humans.

Another line of evidence offered for human evolution is evidence of the use of stone tools, or the use of fire, or burials, dating from way before 100,000 B.C. Here is where some surprising new findings come into play to cast doubt on some of these claims.

Homo naledi was a species with a brain of only about 500 cubic centimeters, only about 37 percent as big as modern human's brain. The species is not believed to be a direct human ancestor. Fossils of the species have been found in a cave, and analyzed in a scientific paper by paleoanthropologist Lee Berger. The Washington Post refers to "Berger's bolder claims, including the suggestion that Naledi was burying its dead and crafting the sophisticated stone tools that characterize southern Africa's 'Middle Stone Age.' "

But if a species with a brain only 37 percent as big as a human brain was making tools and burying its dead, a species that was not a human ancestor, that would seem to help wipe out tool evidence and burial evidence as evidence that humans evolved from apelike ancestors. Similarly, a paleoanthropologist has recently written an article entitled, "Stone 'tools' may not have been made by human ancestors, research finds." The article tells us this: "Recent research published

in *Nature* by a team led by Tomos Proffitt at the University of Oxford shows that capuchin monkeys regularly produce sharp-edged flakes indistinguishable from those made by early hominins."

As for the use of fire long before about 100,000 BC, none of it is very conclusive. It's all but impossible to distinguish between fires started deliberately and fires accidentally arising from forest fires or lightning strikes. Most of the claims of fire use long before 100,000 BC seem like "face in the clouds" or "Jesus in my toast" kind of claims, in which we can wonder whether the person making a claim is simply finding something that he hoped to find. It is also possible that some species that was not a human ancestor was able to occasionally make fires. Fire-making is just an example of tool-use, and there are other species that make use of tools. Fire-making does not involve the symbolic manipulations that are a hallmark of a human mind.

A paleontologist states the following about the relevant fossils from the past million years:

They do not allow us to order human fossils in a gradually progressive and smooth transitional lineage from ape-like forms to modern humans. They also do not fall into a temporal cline from older primitive to younger derived forms. Some early australopithecines not only exhibit the expected ape-like features but also some very modern human characters, while some late representatives of Homo (e.g., Homo naledi*) still have very primitive characters. Thus fossil humans do not form a transitional series like the famous horse series.*

According to Darwinist dogma, lucky random mutations occur and cause "classic sweeps" or "classic selective sweeps" in which some new trait becomes more and more common in the gene pool, eventually so common that most organisms in the population have that trait. This dogma has recently struck out at the plate, as more sensitive scans of the human genome have found little evidence of such classic sweeps. A scientific paper was entitled "Classic Selective Sweeps Were Rare in Recent Human Evolution." By "recent human evolution" the paper meant the past 250,000 years.

Another recent scientific study in 2014 found there was virtually no sign of adaptive evolution in the human genome.
The paper published in a mainstream science journal looked for traces of natural selection by looking for something called "fixed adaptive substitutions" in human DNA. The paper stated, "Our overall estimate of the fraction of fixed adaptive substitutions (α) in the human lineage is very low, approximately 0.2%, which is consistent with previous studies." It's hard to imagine a bigger fail or flop for Darwinian explanations. If such explanations were correct, we would have expected to find such signs of adaptive evolution in a large fraction of the human genome, not a fifth of one percent.

In the 2018 book *Who We Are and How We Got Here* by David Reich, a professor of genetics at Harvard Medical School, the author makes this revealing confession on page 9: “The sad truth is that it is possible to count on the fingers of two hands the examples like FOXP2 of mutations that increased in frequency in human ancestors under the pressure of natural selection and whose functions we partly understand.” Judging from this statement, there are merely 10 or fewer cases where we know of some mutation that increased in the human population because of natural selection. The scientific paper “The Genomic Rate of Adaptive Evolution” tells us “there is little evidence of widespread adaptive evolution in our own species."

In the study here, an initial analysis found 154 positively selected genes in the human genome -- genes that seemed to show signs of being promoted by natural selection. But then the authors applied something they called "the Bonferroni correction" to get a more accurate number, and were left with only 2 genes in the human genome showing signs of positive selection (promotion by natural selection). That's only 1 gene in 10,000. Call it the faintest whisper of a trace -- hardly something inspiring confidence in claims that we are mainly the product of natural selection.

Given the failure to detect large amounts of adaptive natural selection in the human genome, we should have no strong confidence in the orthodox account that humans appeared because of Darwinian evolution from some ancestor that was the ancestor of both chimps and humans.

The number of humans that have lived has been estimated at 100 billion. But a web site discussing this issue tells us that 99% of these people have lived in the past 10,000 years. Since 8000 BC some 100 billion humans have lived, but in the period between about 400,000 BC and 8000 BC, the total number of humans or pre-humans who lived during that period was quite probably no greater than about a billion, and very probably less than 3 billion (the average population size being only about 20,000 for most of this time). But we know there has been very little useful evolution of humans since 8000 BC -- only a few minor things like better lactose digestion and better high-altitude breathing in some people. So if you believe the conventional account, you must believe that a population of no more than 3 billion humans or pre-humans underwent enormous useful evolution (resulting in humans that had language, abstract thinking and symbolic abilities), but that in 100 billion humans living since 8000 BC there has been almost no useful human evolution. Such an idea is not credible. Why would there be so much useful evolution during less than 3

billion lives, and so little useful human evolution during 100 billion lives? We would expect the opposite to be more likely.

Just as a prosecutor needs to have explanation of a motive before offering a good case against a defendant, anyone arguing that man was descended from lower species needs to have a believable explanation as to how this occurred. The Darwinian explanation relating to human origins has always been both unproven and implausible. No one has proven or well-substantiated any claim that any impressive case of macroscopic biological complexity ever arose because of a combination of natural selection and random mutations. There is an extremely strong reason for believing that natural selection has never produced any complex macroscopic biological innovation. The reason is that any natural selection related to that particular innovation would only occur *after* the innovation had appeared. Natural selection simply means the improved reproduction rate that may occur *after* a biological innovation makes an organism more fit to survive. But such an improved reproduction cannot possibly occur because of some biological innovation until after the innovation appears. So in general, natural selection is never an explanation for a complex visible biological innovation. An explanation is something that occurs *before* the thing it explains, not after it.

Natural selection is a mere filter, capable of filtering out bad designs, but having no power to produce impressive new designs. A tornado will act as a "survival of the fittest" agent to get rid of bad building designs in a town, leaving only the good designs standing. But it would be ridiculous to claim that a tornado produced a useful new building design after passing through a town, using wreckage as building blocks. It seems equally implausible to attribute such creative powers to natural selection.

You do not rebut such an objection by claiming that it is the combination of random changes and survival of the fittest (natural selection) that produces wonderful new designs, because we have the same combination of random changes and survival-of-the-fittest when a tornado passes through a town. But the chance of a tornado ever producing a good new design of building is infinitely low. And if humans perished, and a billion tornadoes passed through the towns and cities we left behind, over the course of millions of years, we would still not expect one of the tornadoes to ever produce an impressive new building design. With all their intricate biochemical machinery, the complexity of mammals is billions of times greater than the complexity of buildings.

In the book *Evolution and Ecology: The Pace of Life* by Cambridge University biology professor K. D. Bennett, this mainstream authority comments on speciation (the origin of species). He says on page 175, "Natural selection has been shown to have occurred (for example, among populations of Darwin's finches), but there is no evidence that it accumulates over longer periods of time to produce speciation in the Darwinian sense." Similar comments were made by an MIT professor who wrote a long paper entitled "Inadequacies of Neo-Darwinian

Evolution as a Scientific Theory"

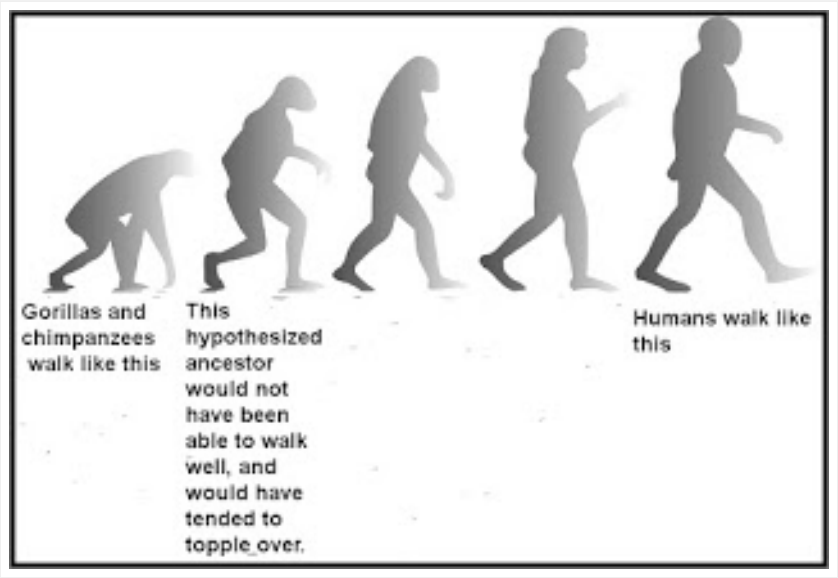
Besides the completely general inadequacy of natural selection and random mutations as an explanation for biological complexity, there are other very powerful reasons why the Darwinian explanation of natural selection and random mutations seems to be grossly inadequate to explain the specific claim that humanity evolved from lower species. The first reason is that the human mind has many unique special characteristics that do not serve any purpose of increasing human survival, and which therefore cannot be explained as being the result of natural selection or survival-of-the-fittest. Among these are spirituality, altruism, self-consciousness, introspection, insight, imagination, philosophical reasoning, language skills, mathematical skills, artistic creativity, and aesthetic appreciation. See here for why such things cannot be well explained by natural selection.

In his essay "The Limits of Natural Selection as Applied to Man," it was forcibly pointed out by the co-creator of the theory of natural selection (Alfred Russel Wallace) that natural selection cannot explain some of these higher capabilities of the human mind. In fact, in his his 1910 book *The World of Life: a Manifestation of Creative Power, Directive Mind and Ultimate Purpose,* Wallace argued that natural selection and random variations were very far indeed from being sufficient to account for the wonders of biology. Darwin engaged in some quite laughable counter-reasoning in his book *The Descent of Man*. Very absurdly, he stated near the beginning of Chapter III of that book, “My object in this chapter is to show that there is no fundamental difference between man and the higher mammals in their mental faculties.” The long chapter that followed contained much very sophistical reasoning and misinformation, such as when Darwin claimed dogs understand many sentences, and when he insinuated in the second-to-last paragraph of the chapter that dogs are kind of spiritual like humans. Such misstatements and bad reasoning do nothing to help with the basic problem. There is a vast gulf between the minds of humans and the minds of animals, and natural selection cannot explain it. That gulf consists of a series of human traits that do not increase survival value in the wild, so such traits cannot have arisen because of natural selection.

There are other grave difficulties in the idea that humans evolved from lower species. One is the difficulty of accounting for the origin of spoken language and the biological changes needed for language. This difficulty is so great that it is sufficient by itself to justify very strong doubt about the natural origin of humans through any process humans understand. In this essay I discuss three reasons why the origin of language is inexplicable under orthodox assumptions.

Another difficulty is the problem of explaining the origin of bipedalism. A species like a chimpanzee uses its long front arms to help it in walking -- what is sometimes called knuckle-walking. That works well for chimpanzees, because the long arms and the hunched over skeleton of the chimpanzee supports that kind of locomotion.

Humans walk erect on two legs. That works well for humans, but only because there are many bone and muscle differences between a man and a chimpanzee, which allow erect walking to occur. The problem is that in order for there to be any evolutionary progression from a species that walked like a chimpanzee to a species that walked like a human, it seems there would have needed to have existed an intermediate species that was halfway between knuckle-walking and upright human-style walking – and it seems that such a species would have been in a disadvantageous state where it was prone to fall over. But according to Darwinian theory based on survival of the fittest, you basically cannot have a progression from highly functional to poorly functional and then to highly functional – because there can be no foresight under such a theory. So accounting for the origin of bipedalism is a nightmare for the orthodox Darwinists, who give us explanations "all over the map" to try to explain this. According to one mainstream web site, "If you ask a roomful of anthropologists" about why humans walk on two feet, "you'd likely get a different answer from each person." That's hardly reassuring for someone troubled by this problem.



Anthropology professor Henry M. McHenry stated this on page 270 of the mainstream book *Evolution: The First Four Billion Years*: "The published hominin fossil record does not yet have a true intermediate stage between an apelike and a humanlike body."

The "waiting time" problem is another gigantic difficulty. To explain that problem, I must first discuss how it is believed that that the human population was very small at a time such as 100,000 years ago or 200,000 years ago. It is believed that at such a time the human population was probably not much more than 20,000. This paper says "we estimate that the effective population size of human ancestors living before 1.2 million years ago was 18,500, and we can reject all models where the ancient effective population size was larger than 26,000." This scientific papers says, "Resequencing studies have estimated the ancestral effective population size at 12,800 to 14,400, with a 5- to 10-fold

bottleneck beginning approximately 65,000 to 50,000" years ago.

The problem is that the smaller the population, the less likely that it will be blessed by some fantastically lucky series of random mutations needed for a biological innovation (just as the smaller the pool of lottery ticket buyers, the lower the chance that it will win the grand jackpot). When you have a very small population, it becomes fantastically unlikely that a series of mutations needed for a biological innovation will occur. So how could there have occurred all the helpful random mutations needed for *Homo sapiens* to appear about 100,000 years ago? The likelihood of such a development seems microscopic.

Two scientists (one from Cornell University) published a scientific paper entitled "The Waiting Time Problem in a Model Hominin Population," which was published in the journal *Theoretical Biology and Medical Modelling*. Using a computer simulation, they "simulated a classic pre-human hominin population of at least 10,000 individuals, with a generation time of 20 years, and with very strong selection (50 % selective elimination)." They were basically trying to see how long it would take before you got a favorable mutation consisting of two nucleotides (which is a fairly minor mutation, only some tiny fraction of the mutations needed for the evolution of human intelligence). This is called the "waiting time problem." The authors summarize their results as follows:

"Biologically realistic numerical simulations revealed that a population of this type required inordinately long waiting times to establish even the shortest nucleotide strings. To establish a string of two nucleotides required on average 84 million years. To establish a string of five nucleotides required on average 2 billion years. We found that waiting times were reduced by higher mutation rates, stronger fitness benefits, and larger population sizes. However, even using the most generous feasible parameters settings, the waiting time required to establish any specific nucleotide string within this type of population was consistently prohibitive."

Their paper calculates a "waiting time" of some 2 billion years to get a crummy little five-nucleotide mutation. But the mutations needed for man would have required many times more than five nucleotides – and our Darwinists ask us to believe that they occurred not in 2 billion years but in a span of time less than a thousandth of that. The chance of that seems less than the chance of you winning a hundred million dollars from the Powerball lottery on each of three consecutive lottery drawings.

A very important point is that we are not even sure that there ever existed any species that humans might have evolved from, and that had about 50% or 75% of the mental power of modern humans. There seems to have been a hominid species with about 50% or 75% of the human brain size, but mental power is not predictable from brain size. Some species such as crows are amazingly smart with very small

brains, while the elephant is nowhere near as smart as man, although its brain is three times bigger than ours.

I have already listed quite a few very powerful reasons for doubting that humans understand the origin of humanity, but there are two additional ones of great substance. The first is that we are not remotely close to understanding how a single human adult is even able to originate from a fertilized human egg. The commonly expressed idea on this topic (that the womb or something in it is reading a blueprint of a human stored in DNA) is demonstrably false. Although it lists chemical ingredients used by humans, DNA is not a specification of a human, and does not at all store either a blueprint for making a human or a recipe or program for making humans. The internal limitations of DNA make it impossible that it could be doing such a thing, for DNA uses a genetic code limiting it to very low-level chemical information such as the amino acid contents of proteins. We actually do not at all understand the progression from a fertilized human ovum to a newly born baby. Not understanding such a progression, we are therefore very largely ignorant about the biology of the individual human, and have no business claiming that we understand the far larger question of how our entire species originated. Similarly, if a child has no real understanding of how a house is built, he has no business claiming that he understands how a city originated. Since DNA is not actually a specification of a human, and is not a blueprint or a recipe for making a human, it seems we should reject the Neo-Darwinist idea that humans have appeared merely because of changes in DNA.

Another extremely substantial reason for rejecting the claim that we understand human origins is that we have no credible biological account of how the human body can be producing the most impressive aspects of human mentality: consciousness, thinking, imagination, self-hood and memory. The standard claim on this topic is that all such things are produced by the human brain, but such an assertion is merely a speech custom of neuroscientists, not something they have established through observations.

There are actually very many strong reasons for thinking that the most impressive aspects of human mentality are things that cannot be produced by the brain. You can read all about such reasons at this site. For example, it is claimed that human memory is stored in brains and retrieved in brains (in the synapses of brains). But we know that the proteins that make up synapses are extremely short-lived, having average lifetimes of only a few weeks -- meaning that the maximum length of time a synapse would seem to be capable of storing a memory is less than a thousandth of the length of time (50 years) that humans can store memories. To give another example, we know synapses and neurons are very noisy things, and that a synapse will transmit an electrical/chemical signal with only about 50% reliability. But a human actor (such as one playing Hamlet) can flawlessly recall 1480 lines, not at all what we would expect if noisy, low-reliable synapses were the basis of such recall. There are very many similar

reasons why we must conclude that our brains cannot account for the more impressive human mental capabilities, such as the fact that no one has any coherent explanation of how any such things as abstract ideas, imagination, self-hood or consciousness could arise from any type of matter, whether it be neurons or any other type.

If it is true that our brains cannot account for all of human mental capabilities and mental experiences (and there are dozens of reasons for thinking that), then we have no business claiming that we understand human origins, for it would seem that there must be some mysterious factor involved to a gigantic extent in our origins that our biologists do not at all understand.

HYPOTHESIS: Humans are descended from some more ape-like species, and appeared naturally because of Darwinian evolution based on natural selection.

PRO:

1. The genomes of humans and chimps are very similar, as we would expect if they had a common ancestor.
2. Various fossils have been found of species with brains midway between that of humans and apes.

CON:

1. No fossils have been found of a common ancestor between humans and chimps.
2. There is no clear fossil and DNA evidence establishing any more ape-like species as a direct ancestor of humans.
3. There is no known natural mechanism that can explain incredibly complex visible biological innovations, and it has not been proven that any such innovation has ever appeared because of natural selection and random mutations.
4. Based on known mutation rates, and the small population size of hominids prior to 50,000 BC, it seems there wasn't even a tenth of the time needed for all the changes involved in humans appearing by 50,000 BC, if random mutations and natural selection were the main explanation.
5. There is a lack of any credible natural explanation for the origin of human language, and the origin of numerous mental human capabilities that are irrelevant to survival value, and cannot be credibly explained by natural selection.
6. There is a great problem in explaining the bipedal walking of humans by evolution from some other species using "knuckle walking," given that an intermediate between the two would have tended to topple.
7. Since there has been very little useful human evolution during 100 billion human lifetimes since 8000 BC, it would seem there would have been very little useful human evolution during less than 3 billion human or prehuman lifetimes between 400,000 BC and 8000 BC – too little to explain the huge changes that supposedly occurred during that period.
8. Since DNA does not actually store a specification of an organism, but merely contains low-level chemical information such as the amino acids in proteins, we cannot credibly think humans originated merely because of some change in DNA.

Click on the visual to enlarge it

There are so many very serious difficulties and unanswered questions involved in all attempts to explain human origins that we should have no great confidence in any of them. We should not regard it as well-established or fairly certain that humans are descended from any previous species (although such an idea still remains a possibility). The most intelligent opinion about human origins is that such a question is an extremely puzzling mystery that is currently far beyond human understanding. The slang expression of today's overconfident person is: "Don't worry – I got this." When it comes to explaining human origins, our evolutionary biologists are always telling us, in effect, "Don't worry, we got this." The reply we should give back to them is: *no, guys, you don't got this.*

Contrary to the insinuations of explanatory dogmatists, we do not at all have a choice between Darwinist orthodoxy and the biblical account of creation. Those are only two of 12+ possible

belief options or speculations one can have about the origin of humans, which I discuss in this post.

Our biologists cannot even explain some of the most important low-level mysteries of biology. Our biologists do not even know how the simplest prokaryotic cell could have originated, and they do not have a credible account of how eukaryotic cells originated (only a very unbelievable tall tale). Our biologists do not even know what causes a cell to split into two copies of itself; they do not know what causes polypeptide chains to fold into the three-dimensional shapes of proteins; they do not know what causes a fertilized ovum to progress to become a human baby; and they do not know how humans are able to remember things for 50 years (despite rapid protein turnover in synapses), and how humans can instantly remember things they learned or experienced decades ago. But even though such basic low-level biological mysteries cannot be well-explained by our biologists, they ask us to believe that they understand something vastly more complicated: the mystery of how human organisms first originated. This is rather like a person who doesn't understand what a boat is telling you he knows how to command an aircraft carrier, or a person who doesn't understand what an atom is telling you he knows how the sun keeps shining, or a person who doesn't understand what a war is or a country is telling you he understands the history of the twentieth century.

Claims such as "we know what caused man's origin" are pushed dogmatically by conformist branches of academia that show much of the same groupthink, hubris and kneeling to authority that we see in organized religions. When we put aside overconfidence and bluffing brags, and look objectively at the matter with a realistic humility, we should realize that our knowledge of nature is very small and fragmentary, and that the very puzzling question of human origins is one that may well take mankind a thousand years to unravel.

Postscript: After countless years of people claiming that *Australopithecus afarensis* (represented by the famous Lucy fossil) was some kind of transitional species between apes and men, we finally have an April 2020 report on the Science Daily mainstream news site, one which tells us that "Contrary to previous claims, the endocranial imprints of *Australopithecus afarensis* reveal an ape-like brain organization, and no features derived towards humans."

On page 207 of the book *Shattering the Myths of Darwinism* by Richard Milton, a book which can be read online here, the author points out that a visualization of *Australopithecus afarensis (*in natural history museums of London and New York) made the species appear to have human-like hands and feet, even though the fossils indicated the species had long curved hands and feet, like those of a tree dweller. We should

distrust all such speculative visualizations, which often are guesses designed to suggest dubious ideas about human ancestry. There have been many artistic visualizations depicting Neanderthal man as being brutish and anatomically more ape-like than modern humans (such as the misleading visualization here). But it has been pointed out that if you were to dress a Neanderthal man in a business suit, he would attract little attention on a New York City subway car. Not very physically different from modern men, Neanderthals were a type of human, and do nothing to prove humans are descended from apes.

A long September 2020 article in *The Scientist* has the triumphal title "Genetics Steps in to Tell the Story of Human Origins." But the article seems like more of a tale of uncertainty and hesitation. We are told that *Homo heidelbergenis* was "not our ancestor," contrary to some previous claims. We are told, "The birth of our genus is one of the most poorly understood periods in evolution." We are told, "The story in Africa remains murky, however, as researchers have not been able to reconstruct human history in vivid detail, in part because hominin fossils informative about our species' emergence and coexistence with other species are rare in Africa." We are told that "the oldest human DNA found on the continent is just 15,000 years old." Since Africa is claimed to the origin place of humans, this suggests that scientists do not have the kind of DNA evidence they need to be making human origin claims with any confidence. The article also has a rather "funny business" kind of chart using some very objectionable scale in which 100,000 years is represented by two inches on the right side of the scale, but 7 million years is represented by two inches on the left side of the chart. The article merely claims that *Homo erectus* is "thought to be a human ancestor," without confidently claiming any pre-human species as a human ancestor.

Posted by Mark Mahin at 9:02 PM No comments:

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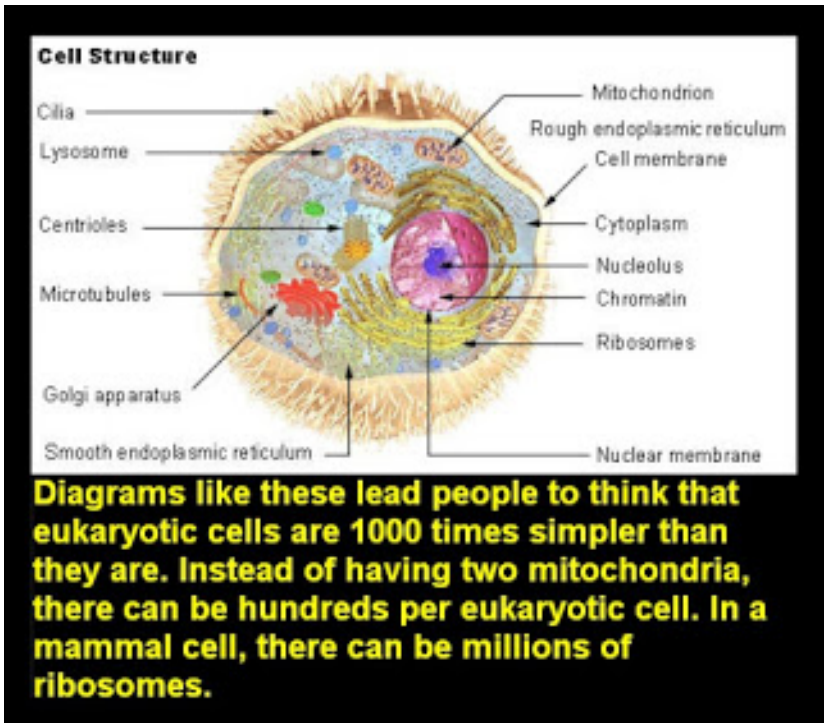
Wednesday, March 6, 2019

The Tall Tale of Eukaryogenesis

The book *Power, Sex, Suicide: Mitochondria and the Meaning of Life* by biologist Nick Lane is one that advances a few unbelievable ideas. The most unbelievable idea it pitches is one concerning the origin of eukaryotic cells.

The cells in our bodies are very complex cells called eukaryotic cells. Such cells are vastly more sophisticated than the much simpler cells we see in bacteria. Such cells are called prokaryotic cells. The analogy that has sometimes been given is that a prokaryotic cell is like a studio apartment, and a eukaryotic cell is like a millionaire's mansion (although a better analogy might be to compare the eukaryotic cell to a skyscraper). The difference between prokaryotic cells and eukaryotic cells is very poorly depicted by cell diagrams, which typically depict eukaryotic cells as being many times simpler than they are.



How did eukaryotic cells originate? Our professors have now standardized on an answer, one that is extremely unbelievable.

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They now maintain that the first eukaryotic cell originated because of an incredibly improbable "combination" accident. The idea is that a bunch of prokaryotic cells somehow ganged up to become a eukaryotic cell – kind of like what would happen if five people collided into each other to somehow originate a new species of three-headed creatures which each had ten legs and ten arms.

Inside a eukaryotic cell are many specialized units called organelles. The organelles include things like ribosomes, lysosomes, mitochondria, and endoplasmic rheticulum. Our professors attempt to convince us that these mitochondria are ancestors of prokaryotic cells that somehow got incorporated into eukaryotic cells.

There are several reasons for thinking that such a thing is far too improbable to have ever happened. Among these are the following:

1. No one has ever observed any type of event like the supposed event in which prokaryotic cells combined to become a eukaryotic cell. Microbiologists have done innumerable experiments with prokaryotic cells, and have never observed any combination of prokaryotic cells become anything like a eukaryotic cell.
2. A prokaryotic cell injected with the DNA of a eukaryotic cell will not start producing eukaryotic cells as its offspring.
3. Nick Lane evidently thinks that that the origin of eukaryotic cells through the process imagined by scientists is so improbable that it has occurred only once in the history of the universe. He states at the end of his book that he thinks "bacterial sludge is likely to be the climax of evolution across this lonely universe." Similar statements have been made by other biologists, based on the vast improbability of prokaryotic cells combining to become a eukaryotic cell. For example, biologist Michael Cobb has stated, "We could, in principle calculate the probability of the appearance of eukaryotes, but we would soon run out of zeros."
4. Nowhere in human DNA does it specify the overall shape of a human body, the structure of a human organ system, the structure of a particular human organ, the structure of a tissue, or even the structure of a cell. Although genotypes influence phenotypes, genotypes do not specify phenotypes. Genotypes merely list chemicals used by an organism. DNA does not specify the physical structure of an organism. We can therefore imagine no conceivable event by which some lucky combination of prokaryotic DNA could result in a cell that produced eukaryotic offspring, because the structure of a eukaryotic cell is not even specified in DNA.

- February (7)
- January (8)

- 2019 (95)
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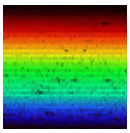
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Ten Fumbles of the "Evolution 101" Web Pages

When an Apparition Is Seen by Not Just One

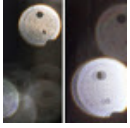
A 1496-Page E-Book of Mine, Available for Free

Let me explain why item 3 in this list is a very big reason for thinking that the "prokaryotic cells ganged up to become a eukaryotic cell" idea (sometimes called eukaryogenesis) is utterly unbelievable. Scientists estimate there are many trillions of other planets in the universe, and we have found many planets not very far from our planet. If a scientist has a plausible explanation for something, he or she will tend to maintain that such a thing will commonly occur elsewhere in the universe. For example, the collision of tectonic plates is a plausible explanation for earthquakes; and if you ask a scientist whether earthquakes occur on many planets, he will say that they do. But if you have an explanation for something that is extremely far-fetched and not at all plausible, you might tend to make a statement suggesting that such a thing happened only on our planet. When any scientist suggests that something has occurred only on our planet, it is a gigantic red flag suggesting that his explanation for that thing is not at all believable.

Show me a scientist who tells us that something happened because of a "once in the history of the universe" event, and I'll show you a scientist who does not have a remotely believable explanation for such a thing.

We may note that the modern account of eukaryogenesis (the origin of eukaryotic cells) is not at all a Darwinian account. The account relies on a sudden leap forward in nature rather than a gradual transition, breaking Darwin's rule that "nature does not make leaps." Just before evoking the principle of "nature does not make leaps," Darwin stated this on page 471 of the first edition of *On the Origin of Species*: "As natural selection acts solely by accumulating slight, successive, favourable variations, it can produce no great or sudden modification; it can act only by very short and slow steps."

It is remarkable that while it is often claimed that Darwinism explains all the wonders of life, the modern biologist does not believe that Darwinian natural selection can explain either the origin of life itself (which must occur before natural selection begins) or the origin of eukaryotic cells. To explain both of these origins, our biologists must basically appeal to a special miracle of a type that has never been observed. In the lab chemicals have never turned into life, and prokaryotic cells have never turned into eukaryotic cells. Hence neither abiogenesis (the claimed origin of life from non-living chemicals) nor eukaryogeneis (the claimed origin of eukaryotic cells from prokaryotic cells) fall into the category of observational science, and both exist in the same "cloud cuckoo land" realm of speculations as string theory and speculations about other universes. For a theory of biological origins to fail to explain the origin of either the first life or the origin of the first eukaryotic cells is as embarrassing a shortfall as a theory of modern global



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- Cosmic Coincidence Cover-up
- The Gigantic Missing Link of Biological Life

conflicts that fails to explain either World War I or World War II.

Let us look at some nonsensical statements Nick Lane makes on the last page of his book, in which he raves on and on about mitochondria with the same overzealous single-mindedness of a besotted teenybopper telling you that her new boy band crush is the secret to everything.

Lane: "Mitochondria teach us how molecules sprang to life on our planet, and why bacteria dominated for so long."

Reality: This statement is not correct. Mitochondria are complex structures in a living cell, and did not exist before life existed. Mitochondria do nothing to explain the origin of life.

Lane: "They [mitochondria] show us why bacterial sludge is likely to be the climax of evolution across this lonely universe."

Reality: Taken literally, this statement is, of course, absurd, since humans (or something more advanced on another planet) must be regarded as the high point of the biological universe. Here Lane teaches that probably no other planet has eukaryotic cells (his "bacterial sludge" being mere prokaryotic cells). But teaching such a thing makes his theory of the origin of eukaryotic cells seem utterly unbelievable. If he had a plausible explanation for the origin of eukaryotic cells, he would not be suggesting that such an event was a unique miracle occurring only on our planet.

Lane: "They [mitochondria] teach us how the first genuinely complex cells came into being, and why, since then, life on Earth has ascended a ramp of complexity to the glories we see around us, the great chain of being."

Reality: Here Lane portrays eukaryotic cells as "the first genuinely complex cells," which is false. Prokaryotic cells simpler than eukaryotic cells are fantastically complex cells, requiring more than 100,000 base pairs arranged in a vastly improbable way to achieve functional performance. Mitochondria do not in any way teach us how eukaryotic cells came into existence, because the theory that eukaryotic cells originated from an incredibly unlikely combination of prokaryotic cells or mitochondria (probably an "only once in a universe" event according to Lane) is not at all a credible theory. And tiny fragments of cells such as mitochondria do not to any extent teach us how complex multi-cellular life could have originated, or why life would have or could have ascended a ramp of complexity leading to creatures such as us that are a trillion times more complicated than mitochondria.

Lane: "They [mitochondria] show us why energy-burning, warm-blooded creatures arose, thrusting off the shackles of the

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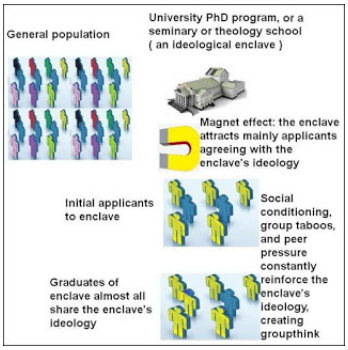
Why a Clique of Scientists Might Do Worse at Judging Truth Than a Jury

When newly awarded PhD's start writing papers and books and judging truth, they are rather like jurors who have been methodically expos...



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Labels

- 3D printing (1)
- abundance (1)
- acupuncture (1)

environment; why we have sex, two sexes, children, why we must fall in love."

Reality: Mitochondria do nothing to explain the origin of warm-blooded creatures such as us, and to suggest otherwise is as silly as saying that bricks teach us why New York City arose. Mitochondria also do not explain the origin of sex, which is a gigantic difficulty for all naturalistic explanations of earthly life. You can understand only a small bit of the difficulty of explaining the origin of multi-cellular sex when you consider questions such as "which came first, the testicles or the vaginal canal," two things that are useless (from a reproduction standpoint) without each other. There are a thousand such "which came first, the chicken or the egg" problems for anyone trying to explain biological innovations, making a mockery of claims that scientists understand such matters.

The evidence given for the theory that eukaryotic cells arose from prokaryotic cells is laughably weak. The evidence given on one university page is that both mitochondria and prokaryotic cells have membranes, and that both have internal DNA. These are hardly strong reasons for thinking that mitochondria in eukaryotic cells are ancestors of prokaryotic cells. Using similar logic, I could argue that a dog must be an ancestor of me, because we have both four limbs and a head. The page neglects to tell us that the number of base pairs in the DNA of a prokaryotic cell is a hundred times greater than the number of base pairs in a mitochondrion, meaning that there is no strong similarity between the two. A mitochondrion doesn't even look like a prokaryotic cell.

You can read here a long Nautilus article about the modern-day folklore about the origin of eukaryotic cells. Use some critical judgment, and you will find no solid evidence is presented. Calling the imagined origin event "ludicrously unlikely" despite arguing for it, the author says, "Prokaryotes have only managed it once in more than 3 billion years, despite coming into contact with each other all the time." But are not those 2.999999999999 billion years in which no such thing happened to prokaryotic cells evidence against the possibility of such a thing?

Postscript: Quanta magazine has a recent article entitled "Researchers Rethink the Ancestry of Complex Cells." The article unintentionally paints a picture of biological theorists in disarray on the topic of the origin of eukaryotic cells, with the thinkers hesitantly vacillating all over the place. Clearly the origin of eukaryotic cells is not a topic our experts understand, despite the pretentious claims they have made to the contrary.

Posted by Mark Mahin at 10:31 AM 2 comments:

Labels: cells, evolution, origin of life

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

Saturday, February 23, 2019

Exaptation or Co-Option Does Not Fix the Incipient Stages Problem

In his book *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life,* Charles Darwin argued for natural selection as the main cause of the origin of species. Darwin used the same term repeatedly to try to explain the fantastically intricate machinery of biological organisms: the word *accumulate* or *accumulation*. On page 29 of the first edition, he refers to "slight differences accumulated during many successive generations." On page 32 of the first edition of the book, he refers to "the great effect produced by the accumulation in one direction, during successive generations." In Chapter 1 he refers to "the accumulated effects of selection." On page 410 he says, "modifications have been accumulated by the same power of natural selection." On page 471 he says, "natural selection acts solely by accumulating slight, successive, favourable variations." On page 480 he refers to "accumulation of successive slight favourable variations." On page 481 he referred to "the full effects of many slight variations, accumulated during an almost infinite number of generations." If you were to state Darwin's explanation for biological innovations in a nutshell, it would be this: *stuff piles up*.

But there is a huge problem with such an explanation. Accumulations are unorganized things; a thesaurus lists "pile" and "heap" as synonyms. But what we have in the human body are fantastically organized systems showing the highest order, coordination and functional coherence. It would seem to make no sense at all to speak of such systems as mere "accumulations."

Darwin did nothing to explain how random changes could achieve any high level of organization, let alone the gigantic degree of organization we see in the human body. Neither Darwin nor any Darwinist has ever explained how natural selection and random changes could ever cause biological parts to become well organized. There is no good evidence that any complex visible biological

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

innovation ever appeared because of random mutations and natural selection, and such an idea is essentially an article of faith in a modern-day secular creed.

In Chapter 7 of the sixth edition of *On the Origin of Species*, which you can read here, Darwin addresses various objections to his theory. On page 170 he states, "A much more serious objection has been urged by Bronn, and recently by Broca, namely, that many characters appear to be of no service whatsoever to their possessors, and therefore cannot have been influenced through natural selection." Darwin concedes on the next page that "there is much force to the above objection." We can state the objection like this: many types of plant and animal species, in particular mankind, have major characteristics that do not add to their survival value, and which therefore cannot have arisen because of natural selection (which Darwin tells us works only to improve survival value or the likelihood of reproduction). In many types of plants (in particular, flowers) we see a vast host of features which rather seem to exist according to some principle of diversity or ornamentation or beauty rather than some principle of biological functionality. Using the term "the biology of the baroque," biologist Michael Denton has pointed out many examples of non-adaptive features in biological organisms: things such as the intricate shapes of maple leaves, the huge variety of colors in butterfly wings, and peacock feathers.

In humanity we see many mental abilities and characteristics that seem to have no survival value for any organism existing in the wild, including spirituality, artistic creativity, philosophical reasoning ability, and mathematical ability. See here for a full discussion of such traits, and how they cannot be explained by natural selection. The co-founder of the theory of evolution by natural selection (Alfred Russel Wallace) wrote an essay stating that the theory could not explain some of the most important mental characteristics of mankind.

On page 177 of the sixth edition of *On the Origin of Species*, Darwin discusses another objection to his theory, saying, "The one new point which appears to have struck many readers is, 'that natural selection is incompetent to account for the incipient stages of useful structures.'" This is the gravest objection to the credibility of Darwin's explanation for biological complexity.

In general Darwinism fails to explain the first stages of useful structures. This was pointed out very clearly in Darwin's time by the biologist Mivart, who wrote the following at the beginning of Chapter II of his book *On the Genesis of Species*: "Natural Selection utterly fails to account for the conservation and development of the minute and rudimentary beginnings, the slight and infinitesimal commencements of structures, however useful those structures may later become." Mivart devoted Chapter II of that book to many examples of "incipient stages" that Darwinism could not explain well. You can read online Mivart's many examples here. Without even reading that, it is easy to think of many examples of incipient stages that would

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

not be useful, such as the first small part of any limb (such as an arm or leg) or the first small part of a wing or the first small part of a mammary gland. Other examples are the first small part of a penis, testicle, or an ovary. On the microscopic level, there is the fact that the first small part of almost every protein molecule is useless.

To try to defend against the objection that natural selection cannot account for the incipient states or early stages of an innovation, Darwin appealed to an idea that is now called co-option or exaptation. It is the idea that a biological innovation can arise when evolution takes advantage of something that had arisen for some other purpose, and uses it for a different purpose.

For example, on page 189 of the sixth edition of *On the Origin of Species*, Darwin pointed out that Mivart had complained that in their earliest stages, mammary glands would not have been useful for providing milk for an infant:

Mr. Mirvart asks: "It is conceivable that the young of any animal was ever saved from destruction by accidentally sucking a drop of scarcely nutritious fluid from an accidentally hypertropied cutaneous gland of its mother? And even if one ever was so, what was the chance of the perpetuation of such a variation?" But the case is not here put fairly. It is admitted by most evolutionists that mammals are descended from a marsupial form; and if so, the mammary glands will have first been at first developed within the marsupial sack.

Here Darwin was trying to use the idea of co-option, arguing that the mammary glands in the breasts of mammals weren't too hard to develop, because they were co-opted from glands in a pouch-like structure of marsupials from which mammals are descended. But today's evolutionary biologists do not maintain that mammals are descended from marsupials. So this example by Darwin of a co-option now must be dismissed as erroneous reasoning.

Darwin also tried to use the swimbladder of fishes as an example of co-option, implying that lungs were not too hard to develop, because they developed from an earlier organ that existed for a different purpose, for the purpose of helping some fish float. On page 147-148 of the sixth edition of On the Origin of Species, Darwin argued as followed:

The illustration of the swimbladder in fishes is a good one, because it shows us clearly the highly important fact that an organ originally constructed for one purpose, namely, flotation, may be converted into one for a widely different purpose, namely respiration....All physiologists admit that the swimbladder is homologous or "ideally similar" in position and structure with the lungs of the higher vertebrate animals; hence there is no reason to doubt that the swimbladder has actually been converted into lungs, or an organ used exclusively for respiration.

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

But this example of co-option or exaptation must also be placed in the trash can. This is because modern evolutionary biologists tell us that the first swim bladders appeared after the first lungs appeared, not before them. The Wikipedia article on swim bladders tells us, "Darwin reasoned that the lung in air-breathing vertebrates had derived from a more primitive swim bladder, but scientists now believe that the swim bladder derived from a more primitive lung."

Other supposed cases of co-option or exaptation are not much better than these cases. It is claimed that eyes evolved from organs derived for a different purpose, the purpose of telling light from dark. But this is not real co-option, because there would be no difference between the most primitive type of vision and the ability to tell light from dark. Place a few sheets of paper in front of your eyes, and you have something that is both the weakest type of vision and something allowing you to tell light from dark.

All claims of exaptation or co-option on a large visible scale are speculative. We have no proof at all that any single complex biological innovation evolved from any previous biological structure that served some different purpose. When scientists speculate that flying feathers arose from feathers that appeared for the purpose of attracting mates or keeping warm, they are just engaging in wild guesses that don't sound credible. Even if such claims were true, they would have little force, since the origin of, say, a seductively attractive feather would be as hard-to-explain (from random mutations) as the origin of a feather for flying.

It seems, in fact, that a Darwinist will be hard-pressed to produce a single credible major case of co-option, in which evolution could have conveniently converted one system or organ created for one purpose, and used it for some other purpose. This should surprise no one. It is, in fact, extremely rare for you to have a situation where a complex object existing for one purpose can be conveniently converted to serve some entirely different purpose. Examples of co-option are few and far-between. There is a simple reason why this is so. In the great majority of cases, once some object (whether biological or inorganic) has been specialized to serve some particular purpose, it then becomes so specialized that it is no longer possible to easily adapt it to serve some very different purpose.

Looking around my humble living quarters, I see the following objects: some beds, some chairs, a sofa, an alarm clock, a fan, some book shelves, a television, a cable box, some computers, a bicycle-type exercise machine, two tables, some pots and pans, an oven, a refrigerator, a dental irrigation device, some cell phones, some cameras, a video game console, a video game controller, a flashlight, a hammer, an air conditioner, and an air filter. Thinking about all of these things, I can find no case in which any one of them could have been built from a simpler invention which originated to serve some different purpose. Also I cannot think of a single way in which I could

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

extend or slightly modify any of these objects so that they could serve a different purpose.

If parts or objects are specifically designed to be re-usable and to be "building blocks," then you might be able to use them for many different purposes (Lego blocks are an example). But if something functional is complex, and has not been specifically designed to be re-usable and to be a kind of building block, it will tend to be so specialized that it cannot be used for different purposes other than the special purpose for which it originally existed. Co-option or exaptation (in which evolution achieves some new purpose by using something "on the shelf" which originated for some other purpose) is something that we would not expect to happen other than very, very rarely.

A simple example can show why appealing to co-option or exaptation is not an effective defense against claims that natural selection and random mutations could not produce very complex functional structures. Let's say a person argues that it is too unlikely that a log cabin would ever form in the woods by a random falling of logs. You might try to defend against that claim by arguing that it wouldn't be too hard, because an accidentally-forming log cabin might form from the much simpler structure called a lean-to, and that would be easier. But this reasoning is fallacious. The overall probability of falling logs forming first into a lean-to and then later into a full log cabin would not be any greater than the probability of the log cabin forming from falling logs in a way in which no lean-to existed while the log cabin was forming. Similarly if it would require five lucky random mutations to achieve some biological structure serving one purpose, and then five other lucky random mutations for that structure to be converted to serve some different purpose (call it the second purpose), then overall achieving this second purpose would not be much more likely than it would be if no such conversion occurred, and you needed ten random mutations to achieve the structure serving the second purpose.

I can explain another general reason why the idea of co-option or exaptation does not work in overcoming the problem that natural selection cannot explain the incipient stages of complex innovations. The reason is that in almost all cases in which we can imagine one complex biological innovation (used for one purpose) changing into some other biological innovation (used for some other purpose), there would be a loss of functionality before there was an equally great gain of functionality; and such a thing would be forbidden under Darwinian assumptions.

In almost all cases in which we can imagine some biological thing gradually evolving from one function to another, there would be an intermediate stage involving a decline in functionality. For example, if some species with arms were to evolve so that the arms became wings, that would be an example of co-option or exaptation. But there would inevitably be an intermediate stage in which these arms-

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

becoming-wings were less useful as arms, but not yet useful as wings. Such a state would involve an intermediate loss in overall function.

Why does this reality discredit the idea of exaptation as a widespread occurrence in biology? According to Darwinian principles, evolution or natural selection should never move some biological innovation from one functional state to a less functional state. That's because once the transition was made to a less functional state, the organism would be less likely to survive; and organisms in such a state would become less and less common in the population. If evolution had precognition, and could foretell the future, there would be no problem with imagining a scenario where some organ or appendage (gradually changing over thousands or millions of years) goes from being functional for reason X, to then being less functional, and then to being functional for reason Y. But since evolution or natural selection lacks any ability to foretell the future, such transitions should not occur under Darwinian assumptions.

The site https://www.biorxiv.org is a server for preprints of biology papers. It stores preprints for very many thousands of biology papers (for example, when I searched for articles with "liver" in the title, I got 105 matches). Using the "Advanced search" feature of this site, I searched for biology papers with "exaptation" in the title. There was only one paper found. When I searched for papers with "co-option" or "cooption" in the title -- a term synonymous with "exaptation" – I found only seven papers. All of these papers (which are highly speculative) refer only to claims of a co-option or exaptation on a microscropic level, typically one particular molecule or microorganism or gene. None of these papers claim to have found evidence for exaptation involving a visible structure. Evidently our biologists have actually been able to find very few substantive examples of exaptation, which shows that the idea of exaptation is only a very weak and inadequate defense against the objection that Darwinism cannot explain the beginning or incipient stages of complex biological structures.

In almost all cases that we can imagine an incipient or beginning stage of a complex biological innovation, it is not true that we can find some other purpose that such a thing would have served. For example, no purpose would be served by one tenth of a vision system, one tenth of a circulatory system, one tenth of a reproductive system, one tenth of a digestive system, or one tenth of an arm or leg. In the rare cases in which a use can be found for a small fraction of a biological innovation, the incipient stages problem has still not been beat, because that fraction can always be halved, and almost always no use will be found for that smaller fraction. Show me a rare case where one fifth of some biological innovation is useful, and it will probably be a case where one tenth of such a biological innovation could not have been useful; and show me a rare case where one tenth of some biological innovation is useful, and it will probably be a case where one twentieth of such a biological innovation could not have been useful.

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

On the lowest useful level, organisms are made from protein molecules, and an average protein molecule in a human consists of about 500 amino acids arranged in just the right way to achieve a functional result. In almost all cases, there is a situation where a particular specialized protein molecule is useless if only half of the molecule exists or only a third of the molecule exists (partially because protein folding, required for proper protein function, is a very tricky thing to get right). Here the incipient stages problem exists to a mountainous degree, and the idea of exaptation is all but useless in lessening such a problem. Our biologists have no credible accounts of the origin of any of the more complex protein molecules, and they try to talk about such a topic as little as they can. This difficulty was unknown to Darwin, who had no idea that humans were built from more than 20,000 different types of fine-tuned protein molecules that would be so hard to explain, each one of these an impressive biological innovation.

Our biologists tell us that random mutations and natural selection (the mere fact that fit organisms reproduce more) are sufficient to explain how blind nature was able to leap to stratospheric heights of biological organization and functional coherence. Similarly, a man might tell you that his herbal supplements and excellent athletic shoes can allow him to jump to the top of a cloud. When someone objects that natural selection and random mutations would never be remotely sufficient to cause the appearance of biological organisms more organized and complex than a 747 jet, our biologists say it's not too hard for such towering zeniths of biological organization to be reached, because leaps can be made from simpler things which existed for other purposes (the idea of exaptation or co-option). And similarly, the man with the excellent athletic shoes might tell you it's not too hard for him to jump to the top of a cloud, because rather than jumping all the way from the sidewalk, he can jump from the top of his roof.

What is very amusing in that each time a person tries to use the idea of exaptation to defend Darwinian explanations, he is twice appealing to purpose while trying to salvage a theory of purposeless biological origins. This is because the idea of exaptation or co-option is typically stated as the idea that some biological structure that existed for one *purpose* was then used by evolution for some other *purpose*. When someone uses such "double purpose" reasoning to defend a theory of purposeless biological origins, he is rather like a husband who swears to his wife that he has given up drinking, and then proposes that he and his wife drink a toast to his new sobriety -- not just a vodka toast but a good stiff whiskey toast also.

Posted by Mark Mahin at 9:34 AM 2 comments:

Labels: Darwinism, evolution, natural selection

Wednesday, January 30, 2019

The Science-Flavored Guesswork Known as Phylogenetics

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

Our scientists often give us visual displays designed to impress us with their grasp of nature. Such visuals should often be taken with a large grain of salt. An example is the type of "composition of the universe" pie graph that claims the universe is about 72% dark energy, 23% dark matter and 5% regular matter. As discussed here, the case for dark matter is wobbly. Moreover a 2016 study has cast doubt on the research used to make the claim that the universe is 72% dark energy, raising doubts about whether dark energy even exists.

Another type of scientific visual we should have little trust in are those visuals showing a kind of "tree of life" that supposedly shows how one type of life evolved into another. Such visuals are generated using what is called phylogenetics, which involves attempts to compute the ancestry of living things from studying their genomes.

There is a gigantic amount of data involved in the genome of a single organism. Comparing the genomes of many different organisms for similarities becomes a task too data-intensive for a person to do in his own head or on paper. When you get into the task of estimating hypothetical inheritance trees, the number of possibilities becomes so gigantic that the task becomes something so difficult that it is often handled by computers.

The idea of doing computer analysis on genomes may sound very impressive, but there are several reasons why this type of analysis does not in general provide convincing evidence that some species had a particular ancestry.

1. Phylogenetic programs assume common descent rather than prove it.

The computer programs used for phylogenetic analysis are not programmed to analyze the likelihood that a particular set of species share a common ancestor. Instead, such programs typically assume from the beginning that such species do share a common ancestor, and the programs busy themselves with trying to compute the most probable inheritance tree that can link such species.

2. Phylogenetic programs compute a "most likely" tree of evolution, but such a tree is not a *likely* "tree of evolution."

One must be careful to distinguish between the concept of "most likely" and "likely." "Likely" means having a probability of greater than 50%. But "most likely" means more likely than any other possibility. It is very common for a "most likely" possibility to be unlikely, with a probability of less than 50%. For example, if you choose a random word from a book, the "most likely" choice is the word "the." But such a choice is not a likely choice, and has a likelihood of less than 10%.

In the case of a phylogenetic software, it will not produce an inheritance tree that is likely to be correct. It will merely produce an inheritance tree that may be the "most likely" among many different

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

alternatives that the software explores. But such a tree may still be very unlikely to be accurate.

3.With any complicated inheritance tree problem, there is a "combinatorial explosion" that prevents phylogenetic programs from being able to try all possibilities, so the software resorts to a fragmentary exploration of the solution space.

Anyone who has studied computer science knows that when there are many variables or data points, the number of possible arrangements increases exponentially. A classic example is what is known as the traveling salesman problem. If a salesman has to travel to 20 cities, then the total number of possible travel routes is roughly 20 factorial, which is too large a number to compute.

Given more than 200 species, the possible number of inheritance trees to be considered becomes so great there is no possible way for any computer program to compute all the possibilities. So phylogenetic programs typically resort to a shortcut. They simply allow you to try a certain number of possibilities, and rate each one for its likelihood. The one with the best rating is singled out as the winner. But that's not a method that should inspire confidence. The winner is unlikely to be the actual inheritance tree for the set of species, whenever there are many species being considered.

4. Too few living species have had their genomes analyzed for phylogenetic programs to be very reliable.

According to this government web site, "more than 250" animal species have had their genomes analyzed. The problem for phylogenetic programs is that this is but a tiny fragment of the total number of living species, which has been estimated as 8 million. Consequently, we don't have the data to be reliably calculating an inheritance tree based on so few genomes. Perhaps after very many thousands of genomes have been cataloged, such analysis may be more reliable.

5. We don't have any DNA data for even 1% of the species that previously existed.

The reliability of phylogenetic programs is proportional to how much DNA data we have for extinct species that lived long ago. But we have very, very little DNA data for species that lived long ago. The half-life of DNA is only 521 years, meaning every 521 years half of the DNA information will disappear. So we have no DNA information for species such as dinosaurs. There is no truth to the idea that dinosaur DNA has been preserved because insects that bit dinosaurs have been preserved in amber. That's a fantasy of a "Jurassic Park" movie. When phylogenetic programs try to place dinosaurs in a phylogenetic "tree of life," they must use guesses about what the DNA of dinosaurs looked like. Similar guesses must be made about almost all of the species being considered.

6. We should have little confidence in phylogenetic programs, given their extremely complicated algorithms that are anything but straightforward.

A document on molecular phylogenetics says this: “The likelihood calculations required for evolutionary trees are far from straightforward and usually require complex computations that must allow for all possible unobserved sequences at the LCA nodes of hypothesized trees.” The same document shows an equation for calculating likelihood, the type of equation used by such a program. It looks as complicated as one of the more complicated equations used in Einstein's theory of general relativity. See here to look at some of the extremely complicated math involved.

When computer programs are based on extremely complicated algorithms, there will very often be bugs in the program – either because of an error in the complicated algorithm or because of a failure in accurately translating the complicated algorithm into computer code such as Java. For example, a recent study found bugs in software used to analyze brain scans, and estimated that thousands of scientific studies using such software may be inaccurate. The more complicated an algorithm, the greater the likelihood it will not be accurately implemented in bug-free computer code.

A paper entitled “The State of Software in Evolutionary Biology” reviewed various computer programs used in phylogenetics, and concluded “the software quality of the tools we analyzed is rather mediocre.” A later paper entitled "The State of Software for Evolutionary Biology" stated, "The software engineering quality of the tools we analyzed is rather unsatisfying." It is a huge problem in science that software programs used for scientific analysis are often written by scientists who dabble in computer programming, and the quality of their work is often second-rate. We should no more expect high-quality code from a scientist dabbling in computer programming than we should expect to get high-quality house-building and plumbing from a professional musician who dabbles in making houses.

7. We should have little confidence in phylogenetic programs, because there is no way to test the output of such programs.

As a general rule, our confidence in a type of software should be proportional to the degree to which the software has passed tests. For example, if some baseball prediction software were to predict that a particular player would have a batting average next season of .314, and the player did produce exactly such a batting average, and the same type of prediction succeeded for other players, that would be a good sign that the software was reliable. But in the case of phylogenetic software, there is no way to test its outputs. Although certain types of consistency checks and statistical checks can be applied to the output of phylogenetic software, we have no way of verifying that a "tree of life" or an inheritance tree produced by such software is historically accurate. Anyone in the software industry

knows that untested software is not something you should have much confidence in.

8. Lateral gene transfers cast doubt on the reliability of phylogenetic estimates.

Here is a quote from a 2016 scientific paper:

One of the several ways in which microbiology puts the neo-Darwinian synthesis in jeopardy is by the threatening to "uproot the Tree of Life (TOL)" [1]. Lateral gene transfer (LGT) is much more frequent than most biologists would have imagined up until about 20 years ago, so phylogenetic trees based on sequences of different prokaryotic genes are often different. How to tease out from such conflicting data something that might correspond to a single, universal Tree of Life becomes problematic. Moreover, since many important evolutionary transitions involve lineage fusions at one level or another, the aptness of a tree (a pattern of successive bifurcations) as a summary of life's history is uncertain.

The paper then goes on to say this:

Students of animals and plants have long accepted that incomplete lineage sorting, introgression, and full-species hybridization pose difficulties for the sorts of trees that Darwin might have had us draw. But it is microbes, with their promiscuous willingness to exchange genes between widely separated branches of any "tree," that have most seriously jeopardized the neo-Darwinian synthesis.

9. Disagreement about mutation rates undermines the reliability of phylogenetic estimates.

The output of a phylogenetic program may rely on some estimate regarding a rate of mutation. But there is great disagreement about the rate of mutation in the past. A scientist quoted in Nature News says this about the "DNA clock" used in phylogenetics:

"*The fact that the clock is so uncertain is very problematic for us," he says. "It means that the dates we get out of genetics are really quite embarrassingly bad and uncertain."*

10. Phylogenetic estimates based on microRNAs or fossils conflict with other phylogenetic estimates.

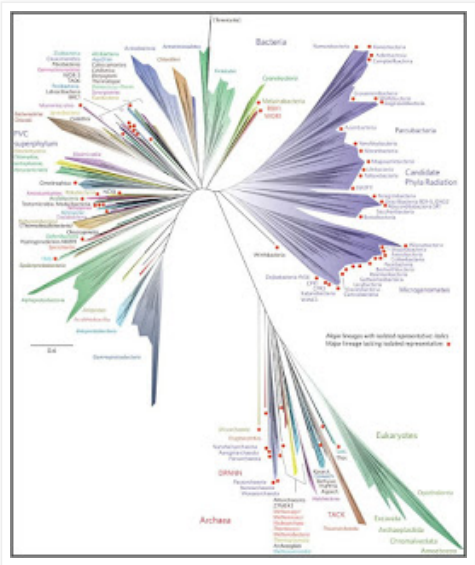
The quote below is from a 2012 article published in the mainstream publication *Nature*:

A molecular palaeobiologist at nearby Dartmouth College, Peterson has been reshaping phylogenetic trees for the past few years, ever since he pioneered a technique that uses short molecules called microRNAs to work out evolutionary branchings. He has now sketched out a radically different diagram for mammals: one that aligns humans more closely

with elephants than with rodents. "I've looked at thousands of microRNA genes, and I can't find a single example that would support the traditional tree," he says. The technique "just changes everything about our understanding of mammal evolution."

The mainstream scientific paper "How reliable are human phylogenetic hypotheses?" gives a troubling answer to such a question. It tells us that "phylogenetic hypotheses regarding humans and their fossil relatives" have "never been subjected to external validation." When the authors tried to do such a validation, they found that "phylogenetic hypotheses based on the craniodental data were incompatible with the molecular phylogenies." This led them to conclude that "existing phylogenetic hypotheses about human evolution are unlikely to be reliable."

Below is a visual from a 2016 paper "A new view of the tree of life." In this paper this visual comes underneath a headline "A current view of the tree of life." You may notice that the strange shape has no actual resemblance to a tree, although it looks a little like some erupting fireworks sparkler stick that I would use as a young boy on the fourth of July.



No doubt computational phylogenetics will continue to be very popular. Although such analysis seems to add little to our knowledge, it's a nice easy way to make a living if you are an evolutionary biologist. Rather than having to do the messy and frustrating work of trying to dig up fossils, an evolutionary biologist can just comfortably sit in an office and crunch genome data. It's a lot easier than writing software, where there is typically the requirement that your computer work must actually achieve some useful innovation. A scientist specializing in phylogenetics can just grind out hypothetical "trees of life" or "ancestry trees" year after year, with very little disturbance from people objecting to his work or analyzing his methods. So if you are an evolutionary biologist making a living doing such comfortable work in a clean office, you will vigorously defend the value of what

you are doing. The last thing you want is to have to go out in the mud and get your fingernails dirty.

Posted by Mark Mahin at 9:20 AM No comments:

Labels: evolution

Tuesday, December 18, 2018

Origins Baloney in the "Cosmos" TV Series

In 2014 millions of people watched the television series "Cosmos: A Spacetime Odyssey" hosted by Neil deGrasse Tyson. Since this TV series was heavily promoted by a host of science-related websites, the viewers of the series must have thought they were seeing nothing but solid factual science. But episode 2 of the series (entitled "Some of the Things That Molecules Do") contained some large errors of fact and logic which we can find by looking at this transcript.

The episode started out by talking at length about how dogs evolved from wolves. Tyson tells us, "The awesome power of evolution transformed the ravenous wolf into the faithful shepherd who protects the herd and drives the wolf away." But this was not actually an example of natural evolution, because it was produced by intentional human intervention, presumably after humans took wolf cubs and started raising them as pets. This example of artificial selection (not natural selection) is therefore an odd thing to be citing as something showing "the awesome power of evolution."

Tyson then states the following:

If artificial selection can work such profound changes in only 10,000 or 15,000 years, what can natural selection do operating over billions of years? The answer is all the beauty and diversity of life.

This statement commits a logic error. It would be logically correct to make a statement like this:

*If **wind erosion** can produce a 1% deformation in something in 10 years, how much of a deformation might **wind erosion** produce in 500 years? Easily 20% or more.*

But by asking us to draw a conclusion about the power of natural selection (something blind) from the power of artificial selection (something guided), Tyson has committed a logic error as bad as in the statement below:

*If **non-blind painters** can produce 100 portrait masterpieces in 200 years, how many portrait masterpieces might **blind painter**s have produced in 500 years? Easily hundreds.*

To the contrary of what Tyson claims, there is a very strong reason why we cannot explain any complex biological innovations merely by saying they were the result of natural selection. The reason is that natural selection never occurs in regard to some complex biological

innovation until after it has appeared. Once a new biological innovation occurs, it may result in an increased reproduction rate or increased survival rate in the organisms with that biological innovation. But such a thing (a natural selection effect) never occurs in regard to some biological innovation until after that biological innovation appears. So natural selection can never be the cause of a very complex biological innovation. You don't explain something by referring to something that occurred after that thing appeared.

Tyson then makes some claims about DNA. He states the following:

DNA is a molecule shaped like a long twisted ladder or double helix. The rungs of the ladder are made of four different kinds of smaller molecules. These are the letters of the genetic alphabet. Particular arrangements of those letters spell out the instructions for all living things, telling them how to grow, move, digest, sense the environment, heal, reproduce.

This is a very big misstatement. Our DNA does not tell a fertilized ovum how to grow to become a baby, does not tell us how to move, does not tell us how to sense the environment, and does not tell us how to reproduce. It is not even metaphorically correct to make the statement quoted above, because DNA does not contain a human body specification. There is no layout or specification of a human bone structure or human limbs in DNA, nor is there any layout of the human eye or ears, nor is there any layout or specification of the human reproduction system. DNA is neither a blueprint nor a recipe for making a human (see the end of this post for quotes by several scientists clarifying that DNA is no such thing). DNA does not contain any instructions telling a fertilized egg how to progress to become a human baby.

How do we know that DNA has no such things? The first reason is that no such blueprint or recipe has been found in human DNA, even though it has been exhaustively analyzed by major multi-year science projects such as the Human Genome Project and the ENCODE project. The second reason is that the expressive limitations of DNA prevent it from ever expressing such complex information. Tyson refers to “the letters of the genetic alphabet.” The way that this alphabet works is that the only things that can be spelled out in such a language are amino acids. Below we see the genetic code used by DNA. The U, C, A and G in the table are the “four letters of the genetic alphabet” Tyson referred to. But as the table makes clear, the only things that can be spelled out with this genetic alphabet are amino acids (such as proline and valine) that are the ingredients of proteins.

First Base	Second Base: U	Second Base: C	Second Base: A	Second Base: G	Third Base
U	UUU Phenylalanine (Phe)	UCU Serine (Ser)	UAU Tyrosine (Tyr)	UGU Cysteine (Cys)	U
	UUC (Phe)	UCC	UAC (Tyr)	UGC (Cys)	C
	UUA Leucine (Leu)	UCA	UAA Stop	UGA Stop	A
	UUG (Leu)	UCG	UAG Stop	UGG Tryptophan (Trp)	G
C	CUU Leucine (Leu)	CCU Proline (Pro)	CAU Histidine (His)	CGU Arginine (Arg)	U
	CUC	CCC	CAC	CGC	C
	CUA	CCA	CAA Glutamine (Gln)	CGA	A
	CUG	CCG	CAG	CGG	G
A	AUU Isoleucine (Ile)	ACU Threonine (Thr)	AAU Asparagine (Asn)	AGU Serine (Ser)	U
	AUC	ACC	AAC	AGC	C
	AUA	ACA	AAA Lysine (Lys)	AGA Arginine (Arg)	A
	AUG Methionine (Met) or Start	ACG	AAG	AGG	G
G	GUU Valine (Val)	GCU Alanine (Ala)	GAU Aspartic acid (Asp)	GGU Glycine (Gly)	U
	GUC	GCC	GAC	GGC	C
	GUA	GCA	GAA Glutamic acid (Glu)	GGA	A
	GUG	GCG	GAG	GGG	G

DNA is therefore merely a repository of chemical information. It is not some blueprint or recipe for making a human, and its structural limitations prevent it from being such a thing. Consider a traffic light. A traffic light is an information system capable of presenting only three items of information: the messages “STOP,” “GO,” and “CAUTION.” Just as the physical limitations of a traffic light greatly limit the type of information it can present, the physical limitations of DNA greatly limit the type of information it can present, limiting such information to be only chemical information rather than complex structural biological information. The shapes and structures of complex three-dimensional organs and organ systems cannot possibly be expressed in DNA given the limitations of the genetic code, nor can complex assembly instructions such as would be needed to specify how to create a human body.

A third reason why Tyson cannot be correct in saying that DNA is something that contains “the instructions for all living things, telling them how to grow, move, digest, sense the environment, heal, reproduce” is that if DNA were to contain such information, which would be fantastically complex instructions, there would be nothing in a human womb capable of understanding instructions so complex. A blueprint dumped at a construction site (containing lumber, nails, bricks, mortar, copper wire and pipes) doesn't cause a building to be built. The building is only built because there are agents smart enough to read and understand the blueprint and act on its instructions. But we know of nothing at all in a human womb that would be capable of reading and understanding incredibly complex instructions for making a human if they were in DNA. Wombs don't have brains or minds.

So how is it that humans are able to reproduce? How is that a fertilized ovum is able to progress to become a full-sized baby? That is a gigantic mystery of biological life that we don't understand. The reality that DNA does not specify body plans or a recipe for making an organism is a fact that contradicts and smashes all attempts to explain a progression of earthly life forms merely by citing a progression of genomes, which is exactly the faulty explanation that Tyson relies on.

Tyson next tries to warm us up to the idea that random mutations (random changes in DNA) can produce changes in organisms. He first presents the very unimpressive case of a mutation that might have caused a bear with dark fur to become a bear with white fur, giving a camouflage advantage if the bear lived in a snowy climate. Strangely, the 2014 episode I am discussing was written two years after the New York Times reported "Polar bears...are not descended from brown bears, scientists report."

But regardless of whether it did occur, a possibility such as the one Tyson has mentioned is not terribly improbable. Such a thing is called microevolution, a small change in an organism that does not involve any complex innovation. Microevolution does indeed sometimes occur.

You can get a rough idea of the likelihood of a favorable random mutation by considering the case of a monkey at a keyboard. If you are an average typist with about a 1% typing error rate, and you bring in a monkey to randomly strike a key on your keyboard, the chance of that random keystroke improving your text is about this 1% figure multiplied by the number of keys on the keyboard. This gives a probability of about 1 in 3000. Similarly, a random mutation in DNA might have something like 1 chance in 3000 of producing some tiny improvement that natural selection might favor.

But what's the chance of getting a new functional protein from random mutations? The chance of this is exponentially smaller. An average protein consists of about 200 amino acids arranged in just the right way to achieve a particular functional effect. There are 20 amino acids in the genetic code. A protein with 200 amino acids might have its amino acids arranged in 20 to the 200th power ways (20^{200} ways), and only a microscopic fraction of these would be functional. Similarly, there are roughly 30 to the 200th power ways in which a typing monkey might type random text (30^{200} ways), and only a microscopic fraction of these would be meaningful useful instructions.

So while it is not terribly improbable that a typing monkey might produce a keystroke that improves your written text (such a thing having a probability of about 1 in 3000), it is almost infinitely more improbable (more than a trillion quadrillion quintillion times more improbable) that a typing monkey might produce a usable 200-word computer program. And similarly, while it is not all that improbable that a single mutation might produce some small improvement in a genome, it is almost infinitely more improbable (more than a trillion quadrillion quintillion times more improbable) that random mutations might conspire to produce a protein of 200 amino acids arranged in just the right way to produce some novel functional effect. Given a billion typing monkeys across the globe hitting typewriter keys for a billion years, we would not expect any of them to produce a functional 200-word computer program; and given five billion years of random mutations across the globe, we would not expect a functionally useful new protein of 200 amino acids to appear by such chance mutations.

The human genome contains genes for about 20,000 such proteins.

In the Cosmos episode, Tyson tells us a story about the appearance of a functional protein. Here is what he says:

In the beginning, life was blind. This is what our world looked like four billion years ago, before there were any eyes to see. Until a few hundred million years passed, and then, one day, there was a microscopic copying error in the DNA of a bacterium. This random mutation gave that microbe a protein molecule that absorbed sunlight.

Of course, this is utter nonsense. A random mutation changes exactly one nucleotide base pair in DNA, and its effect is never greater than changing or adding one particular amino acid in a protein. But proteins are made of hundreds of amino acids arranged in just the right way to achieve a functional effect. If a light-absorbing protein molecule had appeared by random mutations, this would have required a fantastically improbable conspiracy of random mutations occurring over millions of years. But Tyson has told us that “one day” such a functional molecule has appeared, because of a single random mutation. This is as crazy as someone saying that a monkey could produce a 200-character functional new computer program by typing a single keystroke (or an intelligible 50-word recipe by typing a single keystroke).

The molecular complexity of proteins was unknown to Darwin, who also knew nothing of the complexity of the cell. Proteins are a great embarrassment to all who would claim that humans are the result of blind forces. Our bodies are built of many thousands of proteins, but scientists have no credible accounts for the origin of any protein, and each is as complex a piece of functionality as a 200-word computer program. A mainstream scientific paper says, "A wide variety of protein structures exist in nature, however the evolutionary origins of this panoply of proteins remain unknown."

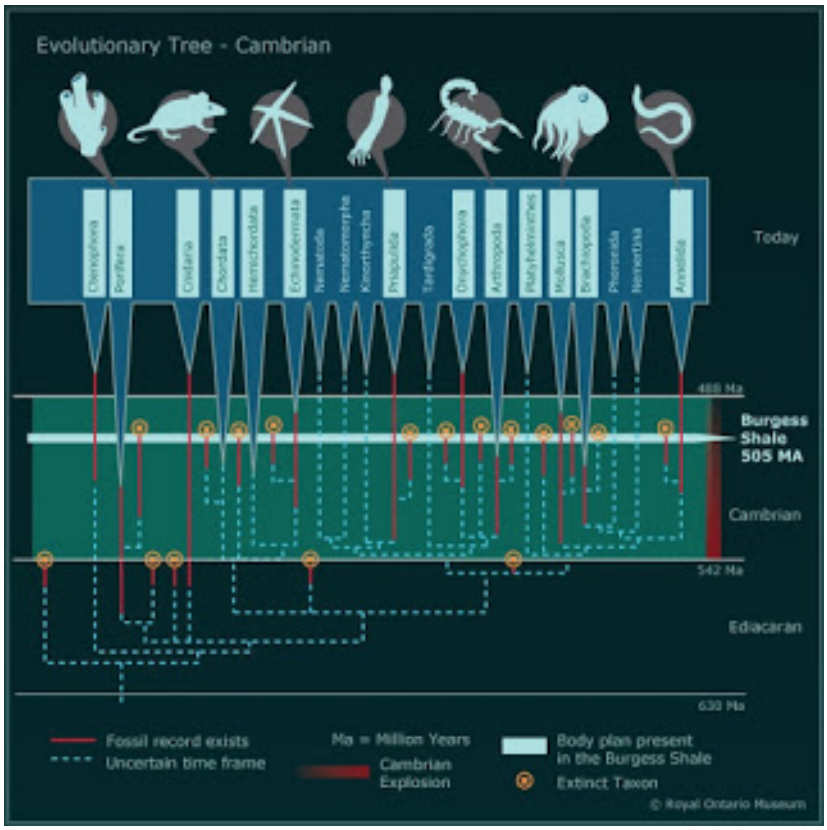
Tyson then tells us the following tale:

Here's a flatworm's-eye view of the world. This multi-celled organism evolved a dimple in the pigment spot. The bowl-shaped depression allowed the animal to distinguish light from shadow to crudely make out objects in its vicinity, including those to eat and those that might eat it a tremendous advantage. Later, things became a little clearer. The dimple deepened and evolved into a socket with a small opening. Over thousands of generations, natural selection was slowly sculpting the eye.

Tyson is using here a standard strategy for those trying to suggest that vision systems could have appeared accidentally: start out by mentioning the tiniest visual structure you can imagine, and hope that people regard this as something very simple that could have easily appeared accidentally. But if you were to delve into all the microscopic details and biochemistry details, you would find that this tiny thing is actually extremely complex. Cells are very tiny, but they

have functional complexity so great they have been compared to small cities. There are 1000-page books devoted to nothing but describing the complexity of cells. And the flatworm organ Tyson refers us to is much more complicated than a cell.

Flatworms have primitive light-sensing structures called ocelli. In the quote above Tyson implies that first we had the fairly primitive ocelli of the flatworm, and then much later we had the first real eyes. This does not match what the fossil record tells us. Animals with the primitive ocelli of the flatworm do not appear earlier in the fossil record than animals with complex eyes. Both the flatworms and many types of animals with eyes are believed to have first appeared at the time of the Cambrian Explosion in which most of the animal phyla rather suddenly appeared, contrary to what we would expect from Darwinian gradualism. There is no fossil record of any primitive eyes that appeared before the first complex eyes in the fossil record, and which are believed to be the predecessors of species with complex eyes.



The visual above (from this mainstream science web site) shows the situation. The flatworms are the Platyhelminthes. Fish with eyes appeared in the phylum Chordata, the same phylum of humans. There is no evidence of fish descending from flatworms, and no evidence that the first animals with good eyes descended from flatworms (contrary to what Tyson has insinuated).

A very important misstatement by Tyson is his claim that the crude visual organ of the flatworm had the ability to “distinguish light from shadow to crudely make out objects in its vicinity, including those to eat and those that might eat it.” This amounts to a claim that flatworms have vision. But they have no such thing. They merely have

a light-sensitive patch sufficient only to tell lightness from darkness. The primitive "eyes" of a flatworm (its ocelli) are not sufficient for it to "crudely make out objects in its vicinity." And the tiny "brain" of a flatworm (with only a very small number of neurons) is way too small for vision. A scientific paper says this of the flatworm's-eye: "There is no image-forming apparatus, and the eye is probably used merely as a detector of light with directional sensitivity."

What difference does it make whether a light-sensitive patch of an organism is sufficient to provide a crude, blurry form of vision, rather than merely telling an animal which direction is up and down? It makes a very great difference to the question of whether we can reasonably imagine a gradual evolution of an eye from a primitive light-sensitive patch. If a light-sensitive patch and the tiniest brain (like a flatworm has) is sufficient to produce crude vision, then we can imagine that each additional change leading up to an eye producing clear vision was a change producing a benefit to the organism that had such a change. If, on the other hand, a light-sensitive patch and the tiniest brain is not sufficient to produce vision, then we have to imagine many additional changes in the eye region and brain occurring without producing any reward, until finally after many required changes there occurred the late reward of functional vision. The latter scenario is one that is not credible under Darwinian assumptions.

There is no reason why natural selection would make a whole bunch of changes to produce a vision system unless there was a continual reward for each change in such a series of changes. But it very frequently happens (inside of biology and outside of it) that there is no continually rewarded path leading to a new complex innovation, and no reward comes until many changes are made, and many parts are arranged in just the right way. Such "late reward" scenarios are far more common than "continual reward" scenarios, a fact that constantly stymies and short-circuits explanations of the type Tyson is trying to make here. On the protein level, the origin of every functional protein is a "late reward" scenario (halves of a protein molecule being non-functional), so in the human genome with genes for some 20,000 proteins, we have some 20,000 "late reward" scenarios that all defy attempts to explain them by imagining some continually rewarded Darwinian path.

What Tyson has done is to paint a speculative picture of continually rewarded evolution from a primitive light-sensitive patch (supposedly producing crude vision) to an eye. The scenario is not supported by the fossil record, and is not credible because light-sensitive patches on organisms like flatworms do not at all produce crude vision. And when we delve down to the protein level, we find that even this supposedly primitive light-sensitive patch would require a very high state of functional amino acid organization most unlikely to ever appear by chance.

Based on these numerous misstatements and misleading impressions, Tyson claims, "The complexity of the human eye poses no challenge

to evolution by natural selection." To the contrary, there is no complex biological innovation that can plausibly be explained by natural selection, which never occurs in regard to a biological innovation until after that innovation occurs. Tyson has reached his reassuring "we got this" conclusion by engaging in various cheats large and small, including the gigantic whopper of claiming that a light sensitive protein might originate on a single day, the crucial misstatement suggesting DNA is a recipe for making an organism, the unfounded suggestion that the first advanced eyes evolved from primitive eyes (which the fossil record does not support), and the erroneous idea that mere light-sensitive patches like those in flatworms produce a crude form of vision. Once we realize that genotypes do not specify phenotypes (merely influencing them), and that DNA does not and cannot store body plans, the legs are pulled from out of the Darwinist explanation for complex biological innovations such as eyes. Since DNA does not actually store the extremely complex structural arrangement of a vision system, there is no way that vision systems could have appeared through any imaginable modification of DNA, whether it be random mutations or anything else.

Near the end of the Cosmos episode, Tyson claims that scientists are "not afraid to admit what we don't know." To the contrary, many of them seem to not at all know what they do not know, and to think that they know very much more than they do know. The typical modern scientist claims that he understands the origin of complex visible biological innovations, but admits that he does not understand the origin of life itself or the mysteries of morphogenesis and embryonic development. It makes no sense to claim that you understand the first of these things without understanding the last two of these things, since there is every reason to suspect that all three are produced by similar causal factors. Man's knowledge of nature is fragmentary, and the mere fragments we have (like ten or twenty pieces of a 400-piece jigsaw puzzle) are not sufficient to allow us to answer biological origins mysteries that may take mankind a thousand years to unravel. It's no sin for a scientist to act like some "Wheel of Fortune" very-early-guesser who guesses the answer after only three or four of the 30 letters have been turned; but such guesses should not be passed off as established truth.

Tyson is one of many scientists who feed us similar origins baloney. Very recently the Science Daily web site (using a Stanford University press release) had a news article entitled, "Why deep oceans gave life to the first big, complex organisms." The article dealt with the great mystery of why most of the known animal phyla suddenly appeared in the Cambrian Explosion, in a vast explosion of organization and functional information that included the first animals with vision systems. We are told in the last paragraph of the article that the explanation offered by an assistant professor Sperling is simply that the temperature at the bottom of the ocean was right for this. Sperling says, "The only place where temperatures were consistent was in the deep ocean. That's why animals appeared there." This is reasoning on the same inane level as trying to explain the appearance of ten

extraterrestrial monsters in your local swimming pool on Labor Day by saying that the reason the ten monsters suddenly appeared was that the water wasn't too hot or cold on Labor Day.

Posted by Mark Mahin at 10:29 AM No comments:

Labels: Darwinism, evolution, natural selection

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Wednesday, November 28, 2018

"Spandrels" Is His Clumsy Explanation for Most of Your Mental Abilities

The recent book *The Human Instinct* by biologist Kenneth R. Miller has the subtitle *How We Evolved to Have Reason, Consciousness, and Free Will*. The book provides a good example of the shallow and unbelievable reasoning that orthodox biologists use to try to explain the human mind.

On page 27 of the book Miller refers to the "evolutionary priesthood," but he makes clear in his book that he wants us to believe in the dogmas of this priesthood. If you're going to confess that some doctrine is being advanced by a priesthood, and if you're going to say as Miller does on page 29 that "perhaps, as some will say, the Darwinian story is a house of cards," then you better give good evidence to back up that priesthood's catechism.

In this regard Miller is not terribly successful. His argument that humans and chimpanzees share a similar ancestor is based on some embryo and chromosome evidence that is murky indeed, at least in Miller's exposition of it. The book attempts no substantive general justification of the claim that very complex biological innovations can appear because of natural selection and random mutations, a claim for which there is still no convincing evidence. We still have no proof that any complex biological innovation ever appeared because of such things.

On page 124 Miller attempts some reasoning to support the idea that brains can produce minds. He says this:

Groups of neurons can act something like switches as well...So, speaking simplistically, neurons indeed mimic the functions of transistors, and therefore it's plausible to think of the brain as a huge collection of neural circuits in the same way that a modern computer is a similar collection of electrical circuits....The image of brain as computer is compelling enough that many have been willing to use that model to explain the workings of the brain, including thought, as

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  - April (8)
  - March (9)

phenomena completely explicable in terms of biochemistry and cell biology.

But there are some reasons why this comparison is a poor one. They include the following:

- Computers don't actually have consciousness, understanding or mental experiences like humans have.
- Computers have very clear read-write mechanisms, and a very clear permanent storage place (a hard drive), but we can't find any clear signs of such things in the brain, as it seems to have no place suitable for storing memories longer than a year, no mechanism for writing memories, and no mechanism for reading memories.
- Computers are deliberately designed products, but evolutionary biologists want us to believe that brains are not designed products.
- If computers just consisted of electrical circuits, they wouldn't be able to do anything. Computers can do some things because they have lots of deliberately designed software, something which has no counterpart in the human brain. Genes are not true software, and are certainly not anything like programs for thinking.

So it seems that the "brain is a computer" comparison doesn't work well at all.

On pages 131 to 134 Miller begins to address an argument made by Alfred Russel Wallace, the co-originator (along with Darwin) of the theory of natural selection. Wallace argued that natural selection is very much inadequate to account for the features and capabilities of the human mind. The problem is that humans have all kinds of refined capabilities that would not have done humans any good from the standpoint of natural selection, in that they would not have increased a human's likelihood of survival or reproduction in the wild. You can read Wallace's original argument here. Among the capabilities that we can list as being inexplicable from the standpoint of natural selection are spirituality, aesthetic appreciation, artistic creativity, mathematical ability, philosophical reasoning ability, refined language capabilities, curiosity, musical capabilities, wonder, insight, imagination and moral sensibilities. Read here for an extended explanation of why such things would have not increased a human's likelihood of surviving and reproducing, and are therefore not explicable from a Darwinian standpoint of natural selection. As Wallace stated, "Natural Selection could only have endowed savage man with a brain a little superior to that of an ape, whereas he actually possesses one very little inferior to that of a philosopher."

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► January (8)

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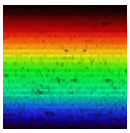
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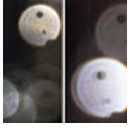
Miller has an answer to such reasoning – a very weak answer. His answer is that such things are evolutionary spandrels. What is a spandrel? The term was first used in a biological context by paleontologist Stephen Jay Gould. He said that spandrels were an architectural feature in domed architecture that were never specifically designed to exist, but arose as just kind of a by-product of other features that were designed for specific reasons. He proposed that we could start using this term "spandrels" in a biological context in this way: whenever we found some feature or capability of humans that would not have been favored by natural selection, we could call that feature a spandrel, and describe it as a by-product of some other feature that would be favored by natural selection.

A person such as Miller who uses this type of reasoning may argue that we developed big brains so we could be better at hunting, and that most of our mental abilities are just by-products of the fact that we have such big brains. On page 162 Miller says, "Wallace's concern...is effectively answered by the concept of evolutionary spandrels."

There are numerous problems with this type of reasoning, which include the following:

1. Any comparison between architectural spandrels and human characteristics is inappropriate for an evolutionary biologist maintaining that humans are not the product of design. If you don't believe humans are the product of design, what business do you have referring to accidental products in human architecture that is a product of design?
2. When something is plausibly explained as a by-product of something else, we can give an exact explanation of why the by-product would occur, given that something else. For example, a solar physicist could give an exact explanation of why solar flares would occasionally occur as a by-product of thermonuclear fusion in the sun; and anyone familiar with the kinetic theory of gases can explain why a scent would arise as a by-product of cooking soup. But we do not know of any neural mechanism that can explain any of the more advanced capabilities of the human mind. We know of no way in which neural activity can produce spirituality, artistic creativity, mathematical reasoning ability, insight, curiosity, philosophical reasoning ability, either directly or as a by-product of anything else. So we don't have any business claiming that such things are by-products of brain activity.
3. Something could only be explained as a by-product of some survival-related skill if there is a close similarity between the two. For example, we might plausibly say that humans accidentally can throw baseballs accurately because such a skill is a kind of a by-product of the ability



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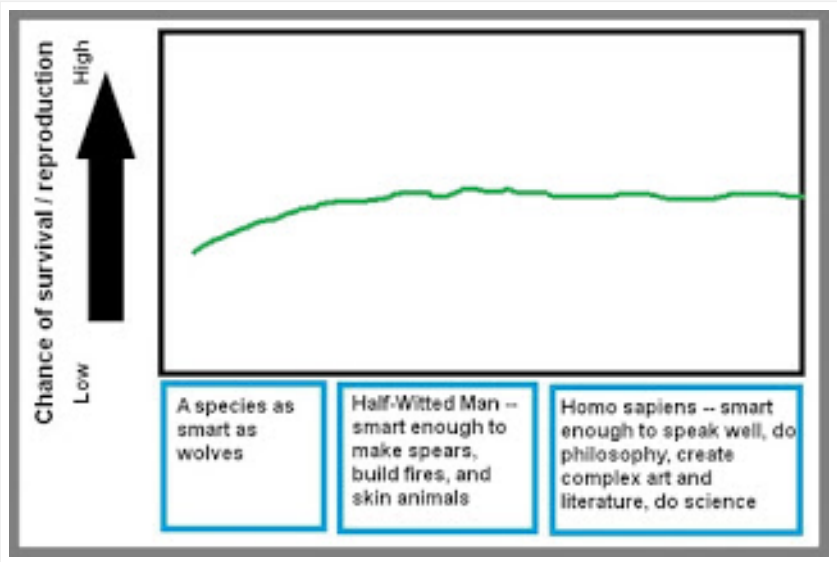
to throw rocks accurately, something cave-men needed to defend themselves from animal attacks and do certain types of hunting. But there is not the slightest relationship or similarity between things such as hunting skills or cave survival skills and philosophical reasoning, spirituality, linguistic creativity and musical ability. So things such as philosophical reasoning, spirituality, linguistic creativity and musical ability cannot be plausibly explained as by-products of something else humans needed for survival.

Let's imagine some species that was rather like man but much less intelligent and with a much smaller brain. We can call this species Half-Witted Man. Let's imagine that Half-Witted Man was smart enough to build spears, make fires, and skin animals, but not smart enough to make art, make complex inventions, speak grammatically, create music, and think philosophical thoughts. Half-Witted Man would have been just as likely to survive as *Homo sapiens*. A band of Half-Witted Men would have done just fine in the wild, just as packs of wolves do fine in the wild. Any small additional survival value that *Homo sapiens* got from its greater intelligence would have been canceled out by the fact that maternal childbirth deaths and stillborn deaths are much more common for organisms with bigger brains, as bigger heads are harder to fit through a vaginal birth canal.

So there's no evolutionary or natural selection reason why there would have been a progression from Half-Witted Man to *Homo sapiens*. Our higher mental abilities cannot be explained as spandrels or by-products of some mental brilliance that man acquired, because there was no evolutionary or natural selection reason why such mental brilliance would have appeared. You don't need to be an Einstein to be a hunter in a pack of hunters; you only need to be as smart as a wolf.

The diagram below illustrates the point.



If it were true that most characteristics and abilities of the

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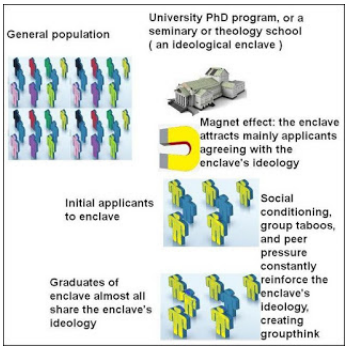

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human mind were things that increased the survival value of primitive humans, this would not at all mean that we had any explanation for the appearance of such characteristics and abilities. This is because no complex innovations can ever be explained by natural selection. Because natural selection can only occur in regard to some characteristic after that characteristic has appeared, we never explain any complex innovation by appealing to natural selection. What kind of situation do we have when most mental characteristics and abilities of humans do not even increase survival value or reproduction likelihood, and thinkers like Miller must say that all such things are mere spandrels or by-products? We have a situation in which it is particularly clear that there is no merit in the pretentious claims of such persons to have explanations for our mental capabilities.

On page 136-137 Miller says this about the evolution of the human brain:

In the jumble of growth and reorganization, new connections were forged that cut through the old structures. It is these connections, these new links, that account for the depth of consciousness and thought that distinguish us from other primates.

But, to the contrary, neither brain cells nor connections between brain cells do anything to account for any of the higher mental aspects or mental capabilities of humans. Thoughts and consciousness are mental things and neurons are physical things. We should not expect thought or spirituality or philosophical reasoning or abstract ideas to be produced by a billion neurons that each had 1000 connections to other neurons; and we should not expect any such mental phenomena to arise even if there were a billion trillion neurons that each had a billion trillion quadrillion connections to other neurons. If any of us think that "connected brain cells" somehow yields a mental ability, it is purely because we have been conditioned to think such a silly idea. If we had always had some very different type of body, or had always lived as creatures of pure energy or pure spirit, we might think such an idea as no more credible than the idea that a bunch of trees all connected by roots can give rise to advanced thinking.

On page 135 to 137 Miller suggests that "spandrels" can explain the origin of language, noting that this view is "enormously controversial" among linguists and anthropologists. His thinking again is along the lines of: we got bigger brains to hunt better and survive better in the wild, and then we got all this stuff like language as incidental by-products of bigger brains. Trying to explain the origin of language in such a way is particularly implausible, because the origin of language requires three things that are much more than just higher thinking abilities. For one thing, you must explain the establishment of

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- brain stimulation (1)
- Brane cosmology (1)
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- Cambrian Explosion (5)

the language itself (its vocabulary and grammar rules), which is pretty much impossible given that you would need to have a language first in order to establish a language among a large group of people, so that all such people started using the same grammar rules and the same vocabulary. Secondly, spoken language requires many language-specific features of the human larynx, pharynx and vocal tract, and such things would not at all appear as incidental by-products of a larger brain. Third, spoken language requires a great deal of specialization in the brain for making the very subtle muscle movements needed for spoken speech. So if an organism merely becomes as intelligent as a human, it would still lack three things it needed for speech. So we cannot at all explain the origin of language merely by saying it was a by-product or spandrel of man's higher intellect.

Miller quotes approvingly on page 141 an argument for the claim that the brain is like a computer. The argument he quotes goes like this: humans can surely compute, because you can add numbers, so the brain must be like a computer. This argument is entirely fallacious, for while we know that humans can add numbers, we do not at all know that brains are doing such a thing. All higher thought could be product of a human soul rather than the human brain.

On page 146 Miller engages in the typical sophistry of people trying to leverage the notion of emergent properties. Such thinkers often remind us that some properties can suddenly emerge. For example, if we freeze liquid water, then we suddenly have the property of hardness that we didn't have before. So, such reasoners say, maybe we can explain life and human mentality as emergent properties. Miller states the following:

Life, as we have come to understand it, is a collective property of many atoms and molecules. In very much the same way, thought is the collective property of millions, no, of billions of neurons.

Such reasoning is fallacious. A property is a single simple characteristic of something that can be expressed as a single number. Width, depth, height, mass and hardness are all legitimate examples of properties (the hardness of an object is measured on the numerical Mohs scale). But neither life nor thought are properties. Underestimating its complexity, we can say life is an incredibly complicated state of organization. That is not a single simple characteristic that can be expressed by a number. As for thought, it also is not a simple characteristic, cannot be expressed by a number, and is not a property.

The reasoning quoted above is also inconsistent with what Miller states on page 168, where he states that “consciousness, similarly, is not a property of matter” but is instead a process,

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- Christmas (1)
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- coronavirus (5)
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- cosmic background radiation (4)
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- cosmic evolution (2)
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- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
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- deathbed vision (4)
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- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
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- disease prevention (1)
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thereby contradicting his claim on page 146 that "thought is the collective property of millions, no, of billions of neurons."

Posted by Mark Mahin at 8:48 AM No comments:

Labels: consciousness, evolution, origin of Mind

Thursday, November 8, 2018

New Study Debunks One Gene Myth of Scientists, but Others Persist

Ever since DNA was discovered in the middle of the twentieth century, many scientists have tended to exaggerate and overstate its importance. Ignoring the physical limitations of DNA, which put the most severe limit on what information can be expressed in DNA, many scientists have trumpeted DNA as some "secret of life" or "blueprint" for constructing humans. Many scientists have spoken as if DNA is some "master molecule" that determines our health, our lifespans, our physical shape and even our mental characteristics. Actual observations have repeatedly clashed and conflicted with such exaggerated ideas.

The first big disappointment for those hoping to prove "genes are our destiny" came in the early twenty-first century, after the completion of the Human Genome Project. As this long project proceeded over multiple years, those who exaggerated the role of DNA repeatedly told us that once the Human Genome Project was finished analyzing and mapping all of the genes in human DNA, there would be some tremendous benefit to the public. We were told again and again by the experts that the Human Genome Project would lead to a host of medical advances that would greatly impact the average person. In 2000 genetic research leader Francis Collins said, "Over the longer term, perhaps in another 15 or 20 years, you will see a complete transformation of therapeutic medicine."

No such thing has happened. The medical advancements produced by the Human Genome Project have been slight. Speaking of the Human Genome Project, a 2010 article in the New York Times is entitled, "A Decade Later, Genetic Map Yields Few New Cures."

In 2011 Jonathan Latham stated the following in The Guardian:

The failure to find meaningful inherited genetic predispositions is likely to become the most profound crisis that science has faced. Not only has the most expensive scientific project ever conceived failed to reach a goal it assured the world it would achieve, but there is also the ticklish problem of why the headlines have been so consistently discrepant with reality. As the failures to find significant genes have accumulated, geneticists have remained silent.

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

A recent scientific study exposes how far off scientists have been in their exaggerations about genes. The study is about how much genes determine a person's lifespan. Based on all the hype we have heard about DNA being "the secret of life" and "the master molecule," you would think that perhaps 60% or 70% of the variation in lifespans between different people can be explained by their genes. Scientists had previously estimated that only between 15% to 30% of the variation in lifespans between people can be explained by genes.

But the new study tells us that such estimates have been way off – not because they are too low, but because they are too high. The study estimates that "well less than 10%" of the variation in lifespans between different people can be explained by their genes. Table 1 of the paper gives estimates of only about 5% for how much the variation in lifespans between different people can be explained by their genes.

So apparently previous scientists have overestimated by between 300% and 600% the degree to which genes affect lifespans (as estimating a 5% effect as a 30% effect is an overestimation of 600%). Are there any other "gene whoppers" our scientists have been telling us? There are a few of these.

One is the frequently stated idea that instincts or behavior tendencies might be the result of genes. It is easy to see why that cannot be true. DNA basically lists only the chemical ingredients of proteins. Essentially the only thing you can state in DNA are which amino acids make up a protein. There is no way in which DNA could be expressing anything like behavior rules. There is no way in which anything like a rule such as "be afraid of snakes" could be expressed in DNA.

Another erroneous idea frequently advanced by biologists is the idea that DNA is a blueprint for constructing an organism. There are a number of powerful reasons why this idea must be false, which I explain in detail here and here. The most powerful reason is that DNA uses a minimalist language in which basically the only words are the names of 20 amino acids. Such a language is sufficient for expressing the linear sequence of amino acids that make up a polypeptide chain, but completely insufficient for expressing complex three-dimensional information such as the shape and structure of an eye or the shape and structure of a reproductive system. Another powerful reason why DNA (and the genes it is made of) cannot be a blueprint for a human body plan is that human DNA has been thoroughly analyzed, through huge scientific studies such as the Human Genome Project and the ENCODE project, and we have found no evidence that human body plan information is stored in it. Also, we know that some species with vastly simpler structures than humans have many more genes than humans. The simple rice plant has thousands of more genes than humans, the opposite of what would be true if genes stored

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

body plans. The total size of human DNA is megabytes is much smaller than the total size of the DNA in megabytes of many plants.

The information in DNA is one-dimensional information, and one-dimensional information is completely insufficient to specify the three-dimensional information needed to specify a body plan. The total size of the human genome is only about 700 megabytes, much less than the genome size of a tomato plant, and way too small to store a specification of a human. A modern CT scanner uses three times more megabytes just to store images of a body that don't even include functional information.

The set of observable characteristics in an organism is called its phenotype. The information in an organism's DNA is called its genotype. Phenotype is not predictable from genotype. Although genotypes affect phenotypes, genotypes do not specify phenotypes or body plans. Similarly, your educational level affects but does not specify your annual income. In the mainstream book "Frontiers in Ecology, Evolution and Complexity," a scientist states the following:

At the beginning of the 21st century, biology confronted an uncomfortable fact: despite the increasing availability of whole genome sequence data, it was not possible to predict, or even clarify, phenotypic observations. In fact, we now know that there is not sufficient information in the linear DNA of the complete genomes to recover and/or understand the diverse phenotypic states of an organism.

Massimo Pigliucci (mainstream author of numerous scientific papers on evolution) has stated that "old-fashioned metaphors like genetic blueprint and genetic programme are not only woefully inadequate but positively misleading."

Why does there persist the myth that body plans are specified in DNA? It's because this is part of Neo-Darwinian dogma. The prevailing version of Darwinism (called Neo-Darwinism or “the modern synthesis”) makes or assumes the following claims:

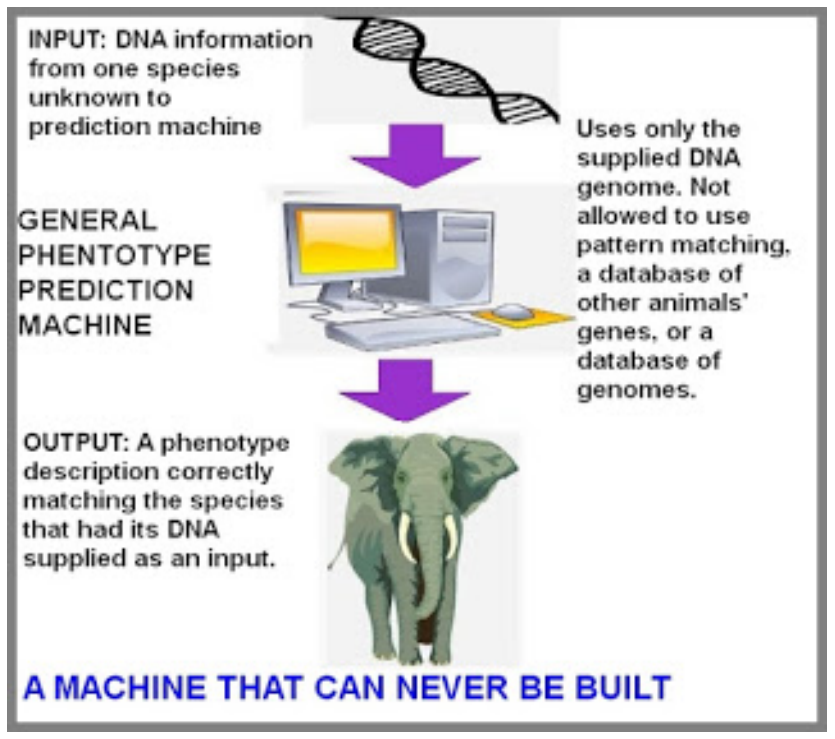
1. Body plans and phenotypes are specified by DNA.
2. Mutations in DNA cause one species to evolve into another species.

The first claim is false. Body plans and phenotypes are not specified by DNA. It is therefore impossible that we could ever explain the evolution of one species into another species merely by assuming DNA mutations, regardless of what effect natural selection had on such mutations. It is conceivable that there is some undiscovered mechanism of information storage or hereditary that might allow one species to evolve into another,

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

but the idea that this occurs merely because of changes in DNA cannot be correct.

We can imagine a device that scientists would have invented by now if it were true that genomes specify phenotypes or body plans. The device (which could be a computer program or collection of computer programs) is one that we can call a general phenotype prediction machine. The device would take as an input the DNA data of a particular organism. The device would then be able to predict what type of macroscopic organism that DNA corresponds to. So if you gave the device the DNA data of a mouse, the device would be able to describe a mouse-like organism. And if you gave the device the DNA data of an elephant, the device would be able to predict an elephant-like organism.



But an important rule of this device is that it could not simply do a pattern match using a database of stored genomes. So the device could not simply check its database to determine which of its many stored genomes was the closest match to the genome supplied as an input. Instead, the device would actually have to deduce the characteristics of the organism based on information in the input DNA. So, for example, if the device were to predict that the organism had two arms, it would have to find some information in the input DNA that specified or implied such a conclusion.

This phenotype prediction device would have to list the characteristics that it predicted that the organism had, and also justify each characteristic that it listed. So if the device declared that the predicted organism had two eyes rather than six eyes or no eyes, it would have to explain what it found in the input DNA to justify such a conclusion. And if the device declared that the

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

predicted organism had two wings rather than zero wings, the device would have to explain what it found in the input DNA that specified such a thing.

Nothing like the phenotype prediction device I have described has ever been created, at least not one that works. The closest thing I can find to the phenotype prediction device I described is one in a 2017 paper with the misleading title "DeepMetabolism: A Deep Learning System to Predict Phenotype from Genome Sequencing." But the system works using multiple types of biological databases (violating my rules), and only allows you to tell which of three types of *E coli* microbes some input DNA comes from. That's light-years from being able to predict the phenotype of a large organism from only its genotype. The misleadingly-titled paper should have been entitled, "DeepMetabolism: A Deep Learning System to Predict *E Coli* Microbe Phenotypes from Genome Sequencing and Lots of Other Data."

No such general phentoype prediction device like I have described will ever be invented and successfully used, unless scientists cheat by sneaking in pattern matching using a database of stored genomes. This is because genotypes do not specify phenotypes. Or to say pretty much the same idea, DNA does not specify body plans. Neither DNA nor genes nor genomes contain a blueprint or set of instructions for building an organism.

Shockingly, we do not at all know where phenotypes or body plans come from. You will sometimes hear people say that phenotype is caused by a combination of genotype and "the environment," but this is misleading. There is nothing in the environment of a newly fertilized ovum that might cause it to turn into a human rather than some very different biological form. An honest and candid statement about the source of phenotypes or body plans would be to say that they must come mainly from some very important facet of reality that we do not understand. You can call it the gigantic missing link of biological life.

But since scientists do not like to admit that their biological knowledge is only fragmentary, you will continue to hear lots of "DNA is a body blueprint" falsehoods in the years ahead. We have been grossly misinformed about DNA and genes for a long, long time, and such misrepresentations will not soon end.

Posted by Mark Mahin at 11:39 AM No comments:

Labels: DNA, evolution, genes, overblown hype, tininess of human knowledge

Thursday, October 11, 2018

The Flaws in Gould's "New Understanding" of Life

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

The book “Universe in Creation” by Roy R. Gould has the pretentious subtitle “A New Understanding of the Big Bang and the Emergence of Life.” Given the incredibly mysterious nature of both of these things, it would seem that no one has any business claiming to have an understanding of them, and a more modest subtitle might have been “A New Outlook on the Big Bang and the Emergence of Life.”

Gould states on page 70, “The Big Bang is not a theory or a hypothesis or guess” on the grounds that it “is a conclusion supported by many lines of evidence.” This is not correct; the Big Bang theory is indeed a theory. According to the Big Bang theory itself, it will forever be impossible for us to observe the first 300,000 years of the universe's history, because matter and energy were concentrated so densely during those years that all light from the first 300,000 years must have been hopelessly scattered. Not only is the Big Bang a theory, but according to the theory itself the theory will forever be unverifiable, because we cannot observe anything in the first 300,000 years of the universe's history. Instead of “many lines of evidence” supporting the Big Bang theory, there are basically only two: the existence of the cosmic background radiation, and the red-shift of galaxies, indicating the universe is expanding.

It is conceivable but unlikely that we might one day find alternate explanations of these two things, and if that were to happen, there would no longer be any reason for believing in the Big Bang. A major current problem with the Big Bang theory is that it does not correctly predict the current distribution of matter and antimatter. The Big Bang theory predicts that the universe should have equal amounts of matter and antimatter (or nothing but pure energy), and this is not at all the case. You can do a Google search for "baryon asymmetry" to read more on this topic. Another major problem with the Big Bang theory is that it does not correctly predict the amount of lithium in our universe. An article yesterday at phys.org says, “The standard models of the Big Bang predict an abundance of Li7, the main lithium isotope, three or four times more than that actually observed.”

There doesn't seem to be anything particularly new in Gould's “new understanding” of the Big Bang. The dust jacket of the book says that the book will expound the idea that “the cosmos expands inward, not outward,” but such an idea is barely mentioned in the text. It seems to have something to do with the idea that the universe is not expanding into empty space, but such a point has already been made many times, so it's hardly new.

As for the emergence of life, Gould advances the idea that life was kind of foreordained by the universe's laws. There is nothing new about this claim, it being a piece of wishful thinking that has been long pushed by those trying to make it

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

look like the origin of life was a not-too-impressive event or a sure thing. Speaking of his 245-page book, he says on page 144, "The remainder of this book presents the chief lines of evidence that life really is written into the universe's building plan." Based on chapter 15 of the book (discussed below), I conclude that when Gould speaks of the universe's "design" or the "universe's building plan," he seems to be speaking merely of the universe's physics and physical characteristics. The idea that life was foreordained by the universe's laws and physics is not a correct one, based on the universe's laws as we currently understand them. To clarify the matter, we must distinguish between necessary conditions and sufficient conditions.

A necessary condition is something that must occur first for something else to occur. A sufficient condition is something that will guarantee that something will occur. For example, water and light are necessary conditions for plant growth, but not a sufficient condition. If we launch into space a sterile globe of water, that globe will have two necessary conditions for plant growth (water and light), but no plant growth will occur.

In regard to the appearance of life, the universe's physics and physical characteristics include many necessary conditions for the appearance of life. There are, for example, quite a few conditions that have to be just right for stable atoms to exist, for planets to exist, and for lots of carbon and oxygen and water to exist. But none of these things are anything like sufficient conditions for life to appear. We know of nothing in the universe's physics or laws that is a sufficient condition for life to appear. Given a planet with suitable temperatures in which there is a mixture of both land and water, we know of no reason at all why there should ever occur the "organization explosion" required for life to form. The origin of life seems to require a fantastically improbable arrangement of matter. Based on what we currently know, such an arrangement should be fantastically improbable, even given billions of years and billions of planets for random combinations of matter to occur.

Based on what we now know about the universe's physics, it seems false to make statements implying that life was foreordained by the universe's physics. It could conceivably be that there are dramatic undiscovered laws of nature that make the appearance of life probable, but we have not discovered any such laws yet. On page 150 Gould states, "The extreme stability of life's infrastructure suggests that, far from being an 'accident,' life is a necessary part of the universe." This statement makes no more sense than claiming that the extreme stability of your house in the woods suggests that the house was a necessary part of the woods.

On page 179 to page 180 Gould tells us about an experiment done by Jack Szostak at Harvard. Gould claims that Szostak "generated one trillion different protein molecules," and found a

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

handful of them were capable of binding to the molecule ATP, a molecule that provides energy in the body. Gould says, “These experiments provide further evidence that life can arise naturally from the universe's initial conditions.” There are two errors here. The first is that the “universe's initial conditions” were the incredible density and heat of the Big Bang, which were, of course, totally inhospitable to life. Even if we amend Gould's statement to be simply “these experiments provide further evidence that life can arise naturally,” it is not a correct statement.

The Szostak experiment Gould describes actually states that it started out with a random generated library of 4×10^{14} sequences, which is 400 trillion. This library was then whittled this down to a library of 6 trillion. The “ATP binding” functionality in question (found in four of the random molecules) was not something terribly complicated. According to the Szostak paper, it involved merely “a core domain of 45 amino acids sufficient for ATP binding.” By comparison, the median number of amino acids in a human protein is about 400, and the median number of amino acids in a yeast protein is about 400. Getting by chance a functional arrangement of 400 amino acids is very many times more difficult than merely getting an ATP binding functionality. The functionality described in the Szostak paper was found in only about 1 in a hundred trillion random molecules, about 1 in 10^{14}.

Why is such an experiment not at all “evidence that life can arise naturally” as Gould claims? In order for a living thing to arise from chemicals, you would need (among other things) many functional proteins, more than 100 of them. You would need these to appear more-or-less simultaneously, to produce a cell capable of self-reproduction. It would not at all be a case that if you got only one of these incredibly unlikely “long shots” producing a protein, that such a protein would stay around until you got the next one many years later. Instead, you would have to get about 100 of these incredibly unlikely long shots occurring at about the same time in the same little space, so that a single cell had everything needed for self-reproduction. We can roughly calculate the odds of that, using a figure suggested by the Szostak paper of a 1 in 10^{14} figure for the chance of one of the proteins being functional (although the chance of each functional protein appearing by chance would almost certainly be some vastly smaller probability such as 1 in 10^{25} or 1 in 10^{50}). It's something like 1 in 10^{14} to the hundredth power, which has a probability of something like 1 in 10^{1400}. We wouldn't expect something that improbable to happen by chance even once in the history of the universe.

Gould states this on page 183:

Nature says, Give me a trillion bacteria, and I'll guarantee that one of them has resistance to your antibiotic. Give me a trillion antibodies, and I'll guarantee that one of them fights the invader. Give me a trillion protein molecules, and you can count on finding the function you are looking for.

But it is extremely misleading to insinuate that given a trillion random protein molecules you'll get any function you're looking for. The functionality of the more complex protein molecules is unlikely to be found even once in a billion trillion random protein molecules. The type of functionality discussed in the Szostak paper is some of the simplest functionality that you could experiment with. Since "ATP binding" is merely connecting to another molecule, you can compare it to the simplicity of an electrical socket. There are countless proteins that have functionality vastly more complex. Protein expert Douglas Axe has estimated that the chance of getting a functional protein from the set of all random proteins is 1 in 10^{74}. This a probability more than 1,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000 times smaller than the "1 in a trillion" probability that Gould is suggesting to his readers.

One of the extremely complex protein molecules used by living things is the hemoglobin molecule. It consists of two "alpha chains" of 141 amino acid residues each and two "beta chains" of 146 amino acid residues each. Getting functionality that complex to appear by chance would require some set of random protein molecules enormously larger than the 400 trillion random proteins in the Szostak experiment – probably 1,000,000,000,000,000,000,000,000,000,000,000,000 or more random protein molecules, more than the number of random protein molecules that would be produced in the history of our planet.

On page 156 Gould says something about the origin of hemoglobin – something goofy indeed. He states this:

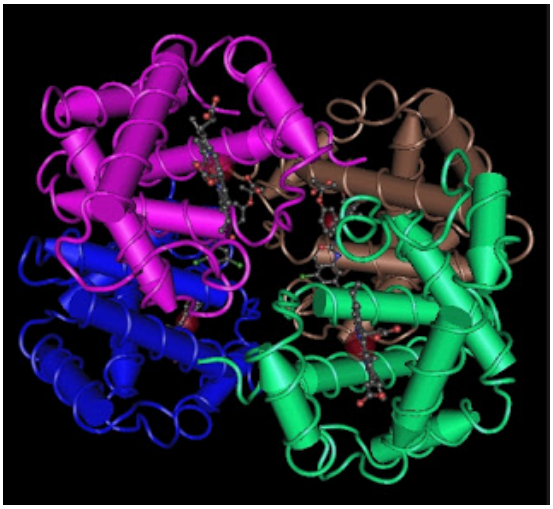
But in practice, nature selects for proteins that automatically fold into a single shape, step by step, as they are manufactured by the cell. An example is hemoglobin, the protein that carries oxygen in the bloodstream.

This type of speech is extremely erroneous. Natural selection simply means differential reproduction, the superior reproduction that can result once an organism gets some biological innovation. A trait or characteristic can only be "selected for" through something like natural selection if the trait or characteristic already exists in one or more organisms of a population. We cannot explain the origin of any complex biological innovation by saying that "nature selected it" or "nature selected for it," for there can be no natural selection

going on in regard to that biological innovation until after it appeared. The sequence of events is:

1. First a biological innovation appears.
2. Then (if other conditions are right) that innovation may cause some organism to have a better survival rate or reproduction rate (natural selection).

Anyone who inverts this sequence and suggests that “nature selected” some complex biological innovation or that nature “selected for” that complex biological innovation is making the elementary error of speaking as if something was caused by a consequence of that thing. It's the same same type of error a person commits when he says that the dark thundercloud was caused by the summer downpour that appeared after the dark thundercloud.



A hemoglobin molecule

The idea of "nature selecting for" hemoglobin molecules becomes all the more absurd when we consider that such molecules are only beneficial if there exists a very complex circulatory system that would have no reason to exist until there were already molecules such as hemoglobin molecules, the interdependence of the two being a kind of "which came first, the chicken or the egg" problem defying our attempts at explanation.

In Chapter 15 (entitled “Design Without a Designer?”) Gould asks, “Can simple rules – for example, the rules with which the universe was born – create something as complex as a human being?” Gould then discusses at length something that he thinks “bears on the question”: the Mandelbrot pattern. Mandelbrot patterns are beautiful patterns that can be produced by simple mathematical rules. But there are two reasons it is laughable to be citing Mandelbrot patterns to shore up the idea that “simple rules” can create something as complex as a human. The first reason is that Mandelbrot patterns are totally non-functional, and are created purely for beauty reasons. The second is that

Mandelbrot patterns do not naturally exist in nature, but are produced only by graphical computer programs designed by humans.

On page 238 Gould tells us "there is every reason to believe that within our lifetimes, we'll hear the historic announcement of the first evidence for life on another world." This is not at all correct, because of the math I previously discussed. If the most primitive living thing requires 100 proteins, and each has a likelihood of no better than 1 in a hundred trillion of appearing, the chance likelihood of life appearing in some particular spot is less than 1 in 10^{1400}. Given such odds, and the failure of all SETI radio searches so far, it is quite absurd for Gould to be saying "there is every reason to believe that within our lifetimes, we'll hear the historic announcement of the first evidence for life on another world." Certainly Gould has not cited any facts or made any arguments justifying such optimism. Life might well exist all over our galaxy and all over the universe, but only if there is some dramatic teleological causal factor at play different from any Gould has discussed.

Posted by Mark Mahin at 10:46 AM No comments:

Labels: evolution, origin of life

Wednesday, August 8, 2018

Why Crummy Research Can Get Highly Hailed

The following thing happens again and again in the world of science and science reporting.

1. Someone will publish a paper providing feeble or faulty evidence for some thing that the science community really wants to believe in.
2. The flaws of the paper will be overlooked, and the paper will be hailed as a great research advance.
3. Innumerable web sites will hail the feeble research, often hyping it and making it sound like it was proof of something.
4. Countless other scientific papers in future years will cite the faulty paper, meaning that there will be a gigantic ripple effect in which weak science gets perpetuated.

We might call this last effect "the afterlife of bad science." Flawed and faulty research will enjoy a long afterlife, reverberating for years after its publication, particularly if the research matched the expectations and worldview of the scientist community.

We see an example of this in the case of a 2002 paper that was entitled "Molecular Evolution of FOXP2, a Gene Involved in Speech and Language." The 2002 paper said, "We show that the FOXP2 gene contains changes in amino acid coding and a

pattern of nucleotide polymorphism, which strongly suggest that this gene has been the target of selection during recent human evolution."

The study rang the bell of those favoring orthodox explanations of the origin of man and the origin of human language. Since FOXP2 was being called a "language gene," the study suggested that natural selection might have helped to spread this language gene, and that natural selection may have had a role in the origin of language. In the following 16 years, the study was cited more than 1000 times by other scientific papers.

With that many citations, we can say that the study won superstar status. But no such thing should have occurred, for the study had the most obvious defect. According to an article in Nature, "It was based on the genomes of only 20 individuals," and "has never been repeated." The authors had no business drawing conclusions about the natural selection of a gene from such a small sample size.

Now, according to the journal Nature, a study using larger data has overthrown the 2002 study. We read the following:

They found that the signal that had looked like a selective sweep in the 2002 study was probably a statistical artefact caused by lumping Africans together with Eurasians and other populations. With more — and more varied — genomes to study, the team was able to look for a selective sweep in FOXP2, separately, in Africans and non-Africans — but found no evidence in either.

No selective sweep means no natural selection in regard to the FOXP2 gene, which wipes out the idea of any gene evidence for a Darwinian explanation for the origin of language. But what could be more predictable? Whenever you do a scientific study with a very small sample size, there's always a very large chance of a false alarm.

The story here is: feeble study gets highly hailed, because it fits in with the belief expectations of the scientific community. Just such a thing goes on over and over again in the field of neuroscience. Every year there are multiple studies published that are trumpeted as evidence for neural memory storage in animals, as evidence for an engram. Usually such studies suffer from exactly the same problem as the 2002 FOXP2 study: too small a sample size. As discussed here, these "engram" studies typically suffer from even smaller sample sizes than the 2002 FOXP2 study, and may involve fewer than 10 animals per study group. With such a small sample size, the chance of a false alarm is very high. Similarly, almost all brain imaging studies involve sample sizes so small that they have little statistical power, and do not provide good evidence of anything.

But the scientific community continues to cite these underpowered studies over and over again, and the popular press trumpets such feeble studies as if they were good evidence of anything. Critics don't seem to get anywhere complaining about “underpowered studies” and “studies of low statistical power.” Perhaps it's time to start saying these too-little-data studies are examples of *crummy research*. “Crummy” is a word meaning “poor because of a small size” – for example, “You must be kidding if you think I'm going to live with you in your crummy studio apartment.”

Using the term “crummy research” for studies that draw conclusions or inferences based on too little data, we may say that a large fraction of the research in neuroscience and evolutionary biology is crummy research -- research such as animal studies that used too few animals, brain scans that used too few subjects, or natural history studies based on too few fossils or too small fragments of DNA. Evolutionary biologists have a bad habit of drawing conclusions based on DNA data that is too fragmentary. The problem is that DNA has a half-life of only about 521 years, meaning that every 521 years half of a DNA sample will decay away. So when an evolutionary biologist draws conclusions about the relation between humans and some hominid species that lived more than 200,000 years ago, such conclusions are based on only tiny fragments of DNA found in such very old species – only the tiniest fraction of the full DNA. Anyone who draws firm conclusions from such fragmentary data would seem to be giving us an example of crummy research.

Some orthodox Darwinists probably gnashed their teeth when they read the new study showing no evidence of natural selection in the FOXP2 gene. For this gene was thought to be one of the few genes that showed evidence of such a thing. In the 2018 book *Who We Are and How We Got Here* by David Reich, a professor of genetics at Harvard Medical School, the author makes this revealing confession on page 9: “The sad truth is that it is possible to count on the fingers of two hands the examples like FOXP2 of mutations that increased in frequency in human ancestors under the pressure of natural selection and whose functions we partly understand.”

Judging from this statement, there are merely 10 or fewer cases where we know of some mutation that increased in the human population because of natural selection. And now that FOXP2 is no longer part of this tiny set, the number is apparently 9 or fewer. But humans have something like 20,000 genes. If only 9 or fewer of these genes seem to have been promoted by natural selection, isn't this something that overwhelmingly contradicts the claim that human origins can be explained by natural selection? If such a claim were true, we would expect to find thousands of genes that had been promoted by natural selection. But the scientific paper "The Genomic Rate of Adaptive Evolution" tells us "there is little evidence of widespread adaptive evolution in our own species."

In the study here, an initial analysis found 154 positively selected genes in the human genome -- genes that seemed to show signs of being promoted by natural selection. But then the authors applied something they called "the Bonferroni correction" to get a more accurate number, and were left with only 2 genes in the human genome showing signs of positive selection (promotion by natural selection). That's only 1 gene in 10,000. Call it the faintest whisper of a trace -- hardly something inspiring confidence in claims that we are mainly the product of natural selection. The 2014 study here finds a similar result, saying, "Our overall estimate of the fraction of fixed adaptive substitutions (α) in the human lineage is very low, approximately 0.2%, which is consistent with previous studies." That's only about 1 gene in 500 showing promotion by natural selection.

Posted by Mark Mahin at 10:09 AM No comments:

Labels: evolution, origin of language

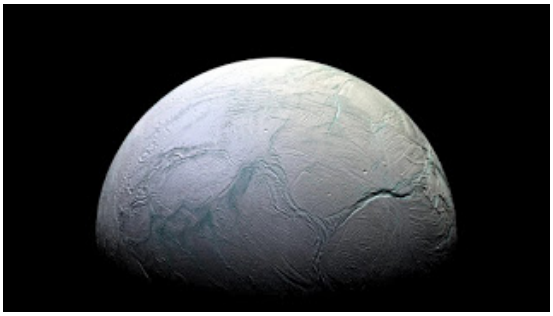
Friday, June 29, 2018

Specious Spin of the "Easy Life" Crowd

What we may call the "easy life" crowd is a group that wants to persuade us that it's easy for life (primitive or advanced) to appear by chance. A few weeks ago the "easy life" crowd was telling us that "building blocks of life" had been found on Mars, and that this greatly increased the chance that life once existed on that planet. However, as discussed here, the actual organic molecules found on Mars were neither the building blocks of life nor the building blocks of the building blocks of life.

This week the "easy life" crowd is at it again. For one thing, they are telling us that the "building blocks of life" have been found on Enceladus, a moon of Saturn. A page on Fox News has the headline "Scientists have found the 'building blocks for life' on Saturn's moon Enceladus." But this claim is as inaccurate as the claim about building blocks of life on Mars.

The claims are based on a scientific paper that does not claim to have discovered any molecules with a molecular weight much larger than about 200 atomic mass units. The building blocks of life are things such as proteins and nucleic acids. The average protein has hundreds of amino acids, and an amino acid has a molecular weight of about 100 atomic mass units. So a protein has a molecular weight of about 20,000 or more. That's 100 times bigger than the molecules detected on Enceladus.



Enceladus (Credit: NASA)

Until some scientist reports detecting something with a molecular weight of more than 10,000, no one should be claiming that "building blocks of life" have been detected on Enceladus. Although the organic molecules detected on Enceladus have a molecular weight about the same as the molecular weight of an amino acid (one of the building blocks of proteins), the exact nature of these molecules is unknown, so we don't know whether any of them is actually an amino acid. So it cannot even be truly said that even the building blocks of the building blocks of life have been detected on Enceladus.

This week's other example of specious spin by the "easy life" crowd comes in the form of an article in Science magazine entitled "The momentous transition to multicellular life may not have been so hard after all."

The article begins by stating the following:

Billions of years ago, life crossed a threshold. Single cells started to band together, and a world of formless, unicellular life was on course to evolve into the riot of shapes and functions of multicellular life today, from ants to pear trees to people. It's a transition as momentous as any in the history of life, and until recently we had no idea how it happened.

The statement "until recently we had no idea how it happened" in reference to the appearance of multicellular life will come as a surprise to those who have been told for many decades by scientists that Darwin's theory of natural selection explained this and all other biological innovations occurring after the origin of life. So after many decades of telling us that the appearance of multicellular life could be explained by mere natural selection and random mutations, now scientists are claiming "until recently we had no idea how it happened." Very fishy indeed.

Our Science magazine article then states this about the origin of multicelluarity:

Now, Nagy and other researchers are learning it may not have been so difficult after all. The evidence comes from multiple directions.

So what is this evidence? The first bit of alleged evidence that multicellularity was easy is described as follows: “The evolutionary histories of some groups of organisms record repeated transitions from single-celled to multicellular forms, suggesting the hurdles could not have been so high.” There is no actual fossil evidence of any such transitions, and the article gives no example to back up this claim. Even if we assume that there were multiple cases of life transitioning from single-celled life to multicellular life, this would not show that it was easy or something other than fantastically improbable. When we see two examples of some thing that seems fantastically improbable, that does not show such a thing is easy, although it may show that more than luck is involved. For example, if you ask me to guess a 15-digit number you are thinking of, and I do that successfully not once but twice, that may suggest that something more than luck is involved (such as ESP), but does not at all suggest that it is easy to guess randomly chosen 15-digit numbers.

Here according to the article is the second item of evidence that the appearance of multicellularity was easy: “Genetic comparisons between simple multicellular organisms and their single-celled relatives have revealed that much of the molecular equipment needed for cells to band together and coordinate their activities may have been in place well before multicellularity evolved.” But this is no evidence that the appearance of multicellular macroscopic life was easy. It's kind of like arguing that it's easy for a tornado to blow through an auto parts store and assemble an automobile, because many of the parts needed for the automobile are lying around in the auto parts store.

Here according to the article is the third item of evidence that the appearance of multicellularity was easy: “And clever experiments have shown that in the test tube, single-celled life can evolve the beginnings of multicellularity in just a few hundred generations—an evolutionary instant.” The article gives a visual of the type of experiments it is talking about. They are experiments in which a few microscopic cells are seen to clump together to make an equally microscopic blob consisting of a few cells adhering together. But such experiments do nothing at all to suggest that it might be easy for microscopic life to evolve into visible macroscopic life such as fishes, trilobites and crabs. You can compare such experiments to someone waving around a big magnet at an auto parts store. After getting a few random auto parts stuck to his magnet, the person might say, “You see – it's easy to form a car by random accumulations of auto parts.” But such a stunt would not at all prove such a thing.

On the basis of these pathetically weak evidence claims, the Science magazine article claims "multicellularity comes so easy." No, the appearance of multicellular organisms such as the many that appeared suddenly in the Cambrian Explosion is a vast explosion of information that is not explained by orthodox theories in biology. Big life forms may exist all over our galaxy and the universe, but not if only random, mindless processes are involved.

Posted by Mark Mahin at 11:04 AM No comments:

Labels: evolution, extraterrestrial life

Tuesday, June 5, 2018

"Most Species Young" Study Makes Biologists Tear Their Hair Out

After the release of a startling new scientific study, it seems more appropriate to ask a question there was already previous reason for asking. The question is: have prevailing explanations in biology flunked the genome tests?

The new study was published in the scientific journal *Human Evolution*. According to a news report on it, "The study's most startling result, perhaps, is that nine out of 10 species on Earth today, including humans, came into being 100,000 to 200,000 years ago." The report quotes one of the authors as saying, ""This conclusion is very surprising, and I fought against it as hard as I could." Given an age of more than four billion years for our planet, you can describe the paper as a "most species young" study, since 200,000 years is less than a ten thousandth of the Earth's age.

The press story on the study does not tell us that this study's findings are inconsistent with the claims of orthodox Darwinism, other than to give us a section heading of "Darwin perplexed." But it is rather clear why such a study clashes with Darwinist orthodoxy.

Darwinism has always maintained that species appear very gradually, because of an accumulation of random mutations that occur over vast periods of times. Almost all random mutations have no effect or a harmful effect. A beneficial random mutation must be extremely rare. Useful biological innovations would actually require combinations of random mutations having a coordinated beneficial effect. Such things should be as rare as monkeys typing out useful software subroutines by randomly striking the keys of a keyboard. But we have been told that such incredibly improbable combinations might occur given vast eons of time.

Given this situation, we can say that the plausibility of Darwinism as an explanation of biological innovations is inversely proportional to the speed at which such innovations occur. A Darwinist trying to explain some large set of biological innovations occurring within a span of a million years must make assertions 100 times less plausible than the same person trying to explain these innovations occurring

over a time span of 100 million years. This is why the Cambrian Explosion has always been a thorn in the side of evolutionary biologists. During the Cambrian Explosion, most of the animal phyla appeared within a relatively short period of time, only about 5 or 10 million years. It has seemed to many that such an "organization explosion" could not have occurred so quickly under Darwinian assumptions.

If the new study is correct, we would have to assume that there was some burst of biological innovation causing 90% of the world's species to originate in the past 200,000 years. Such an "organization explosion" would be as hard to explain as the Cambrian Explosion. In terms of body plans, it would involve a smaller amount of innovation, but the time period would be much shorter than that of the Cambrian Explosion.

The news report on the article attempts clumsily to suggest some things that might explain this explosion of innovation. The report states the following:

Which brings us back to our question: why did the overwhelming majority of species in existence today emerge at about the same time? Environmental trauma is one possibility, explained Jesse Ausubel, director of the Program for the Human Environment at The Rockefeller University. "Viruses, ice ages, successful new competitors, loss of prey—all these may cause periods when the population of an animal drops sharply," he told AFP, commenting on the study. "In these periods, it is easier for a genetic innovation to sweep the population and contribute to the emergence of a new species."

The last statement is literally true, but it is a statement very prone to give someone who hears it a very wrong idea. The chance of a genetic innovation occurring by random mutations is not at all affected by any of the things mentioned. But if by some miracle of luck some useful genetic innovation had occurred, it might be more likely to survive if, for example, there were fewer competitors. Similarly, the chance of trees falling in a forest and forming by chance into a log cabin will not at all be affected by whether there are earthquakes or forest fires in the forest, but if such a miracle of luck happens to occur, the chance of such a randomly-formed log cabin surviving might be affected by the rate of earthquakes or forest fires. There are, in fact, no environmental conditions that would ever make it more likely that random mutations would be able to produce a burst of biological innovation.

So the finding of the study (that 90% of current species appeared in the past 200,000 years) is in conflict with the claims of Darwinian orthodoxy. As I stated before, the plausibility of Darwinian explanations is inversely proportional to the speed at which biological innovations occur. The more biological innovation occurring in a relatively short time span, the less plausible Darwinism is. A phys.org article discussing a

previous study has the headline “Not so fast: researchers find that lasting evolutionary change takes about one million years.” So how could so many species have originated in less than 200,000 years?

The fact that incredibly improbable innovations by random mutations do not become more probable after a mass extinction event is one difficulty. Another difficulty is that we know of no mass extinction event around 200,000 years ago. Geologists do not claim that the earth's environment suddenly changed around that time. The event that supposedly wiped out the dinosaurs occurred millions of years earlier. A look at a graph of temperature changes in the past million years will show nothing special between 50,000 BC and 300,000 BC.

One of the study authors attempts to smooth things over so that readers are not too shocked by the findings of his study. The news story states the following:

“*The simplest interpretation is that life is always evolving," said Stoeckle. "It is more likely that—at all times in evolution—the animals alive at that point arose relatively recently."*

But that idea does not work, for it requires us to believe in biological innovation occurring at a rate gigantically more rapid than Darwinism can account for. Such an idea also is inconsistent with the fossil record, which does not show new species appearing at even a tenth of a rate so rapid (except for the Cambrian Explosion).

The news story ends by mentioning another anomaly found by the study:

And yet—another unexpected finding from the study—species have very clear genetic boundaries, and there's nothing much in between."If individuals are stars, then species are galaxies," said Thaler. "They are compact clusters in the vastness of empty sequence space."The absence of "in-between" species is something that also perplexed Darwin, he said.

The problem in question is a gigantic one for orthodox Darwinian explanations. I have various Java programs that simulate something like random evolution. In one of these programs I start out with a group of simulated organisms consisting of a “DNA string” with 100 mainly random characters. The program makes random mutations on this “DNA,” and checks for the appearance of useful features. So, for example, if this DNA string contains the letters “two eyes” or “two ears” or “two legs” or “two arms” or “two lungs,” then the organism with such a DNA becomes more likely to reproduce (and the more such useful features, the more likely the simulated organism will be to reproduce). Under program conditions similar to that which might occur in the natural

world, the program might run for 2000 simulated generations without any useful innovations appearing. But suppose I modify the program to make it much more easy for biological innovations to occur, making things less realistic. And suppose I start out with simulated organisms that have a few useful features. What I then find is that there occurs a very strong amount of what we may call *species fragmentation*.

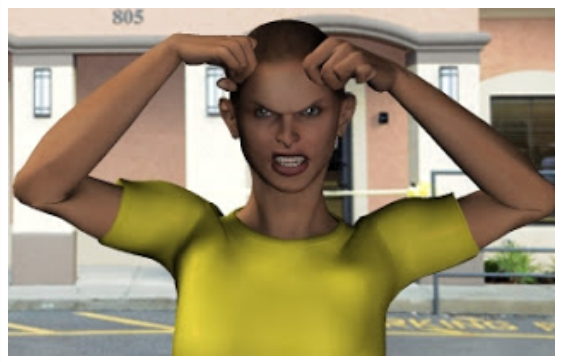
So, for example, imagine I start out with a population of 10,000 simulated organisms that each have no useful features but "eyes" and "legs." If I then run 2000 simulated generations, and "load the dice" so that biological innovations can occur way more easily, I will not end up with something like a new species with eyes, legs, and one or two other features. Instead I will get a situation in which the final population is rather "all over the map." Maybe 1000 simulated organisms will have eyes and legs, another 1000 will have only eyes, another 1000 will have only legs, another 1000 will have eyes and ears but no legs, another 1000 will have only legs and arms but no eyes or ears, and so forth. This type of "species fragmentation" is exactly what should occur under random evolution whenever it is easy enough for innovation to occur relatively rapidly. But that is not what we see in nature. Instead, there are very few or no "in-between" species, and, as the study notes, species are like galaxies in space and the organisms of that species like stars of that galaxy, with no stars between the galaxies.

Then there was another way in which the recent study suggested our biology experts are not on the right track. The news report states the following:

It is textbook biology, for example, that species with large, far-flung populations—think ants, rats, humans—will become more genetically diverse over time. But is that true? "The answer is no," said Stoeckle, lead author of the study, published in the journal Human Evolution. For the planet's 7.6 billion people, 500 million house sparrows, or 100,000 sandpipers, genetic diversity "is about the same," he told AFP.

But how can this be if genetic diversity is caused by random mutations, as Darwinism claims? There are only a certain number of random mutations that occur per 100,000 organisms. So if genetic diversity was really caused by random mutations, we should inevitably expect that a species with billions of organisms should have many times more genetic diversity than a species with a small population. As this paper based on Darwinian principles states, "Genetic theory predicts that levels of genetic variation should increase with effective population size." But according to the new *Human Evolution* study, that's not true. Instead, we have an anomaly that has been called Lewontin's paradox.

So for these reasons the new *Human Evolution* study is a kind of trifecta of aggravation for the mainstream biologist, something that may make such a person tear his or her hair out.



But at the Collective Evolution site, a writer is happy about the study, suggesting it may support the idea of extraterrestrial involvement with evolution.

The recent study is not the first genetic study to confound Darwinian predictions. An interesting series of studies has attempted to look for evidence of what are called "classic sweeps" in the genomes of human DNA. A classic sweep is what would occur if some useful new feature were to occur because of one or more random mutations in the DNA of one organism of a population, with the feature becoming more and more common in the population, because of some benefit it provided that increased the likelihood of survival and reproduction. When the "classic sweep" has finished, the entire population has the beneficial feature. It has long been an assumption of orthodox Darwinists that most biological innovations appear through such "classic sweeps," also called "classic selective sweeps." But a 2011 study in the journal *Science* had the title "Classic Selective Sweeps Were Rare in Recent Human Evolution." By "recent human evolution" the study meant the past 250,000 years.

Such a result is very much at odds with the predictions of Darwinism. For an orthodox Darwinist, if there was very few classic selective sweeps in humans during the past 200,000 years, that's news as bad as it would be for a UFO or SETI enthusiast if we were to find that Earth-sized planets are rare in the habitable zone of other stars.

A more recent scientific study in 2014 found there was virtually no sign of adaptive evolution in the human genome. The paper published in a mainstream science journal looked for traces of natural selection by looking for something called "fixed adaptive substitutions" in human DNA. The paper stated, "Our overall estimate of the fraction of fixed adaptive substitutions (α) in the human lineage is very low, approximately 0.2%, which is consistent with previous studies." It's hard to imagine a bigger fail or flop for Darwinian explanations. If such explanations

were correct, we would have expected to find such signs of adaptive evolution in a large fraction of the human genome, not a fifth of one percent.

Talking about biological origins, our braggart biologists have long been telling us "we got this," but they would be using more truthful slang if they were to lose their hubris and say, "Basically we don't know *jack* about how complex biology originates." The knowledge of man is tiny and fragmentary, and the mysteries of nature are many and mountainous.

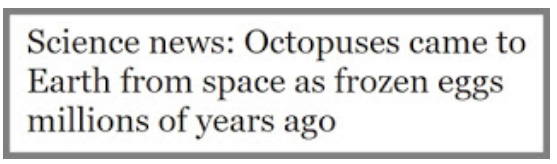
Posted by Mark Mahin at 11:12 AM No comments:

Labels: Darwinism, DNA, evolution, genes, origin of man, tininess of human knowledge

Thursday, May 24, 2018

There's a Better "Octopuses from Space" Theory Than Those 33 Scientists Suggested

When 33 scientists released their interesting paper "Cause of Cambridge Explosion – Terrestrial or Cosmic?" the paper received fairly little attention. That's too bad, because it was an interesting paper fearlessly challenging biological orthodoxy. But now the paper has attracted new attention. Inspired by a speculation in the paper by the 33 scientists, someone released a news story with a headline saying octopuses may have come from space. The excitement may have got started with this outrageous headline from the British tabloid Express:



The tabloid's dubious headline

This, of course, was not actually "science news," but merely a report about a very speculative idea presented in the paper about the Cambrian Explosion written by the 33 scientists. Let's take a look at the wider theory advanced by these scientists, and some reasons why it comes up short.

The theory is that various biological innovations in Earth's past occurred after comets dumped biological material on our planet. One of the great unsolved mysteries of biology is why there was such a massive amount of biological innovation occurring about 540 million years ago in the event called the Cambrian Explosion. During this relatively short period of time, most of the animal phyla now existing originated. For reasons discussed here, such an event has always been hard to reconcile with Darwinian ideas of slow, gradual evolution.

The 33 scientists suggest a strange possibility: that life originated in comets, and that during the Cambrian Explosion our planet may have passed through a cloud of comets. If life had existed on many of these comets, this may have provided our planet with a surge of new biological information. The authors state the following:

It takes little imagination to consider that the pre-Cambrian mass extinction event(s) was correlated with the impact of a giant life-bearing comet (or comets), and the subsequent seeding of Earth with new cosmic-derived cellular organisms and viral genes (Hoyle and Wickramasinghe, 1979, 1981). There may indeed have been a complex comet debris stream implying multiple impacts over the estimated 25 million years at the start of the Cambrian explosion.

The authors also suggest that cometary impacts had something to do with the origin of the octopus. The authors point out that "the genome of the Octopus shows a staggering level of complexity with 33,000 protein-coding genes more than is present in Homo sapiens." The authors state this:

The transformative genes leading from the consensus ancestral Nautilus (e.g. Nautilus pompilius) to the common Cuttlefish (Sepia officinalis) to Squid (Loligo vulgaris) to the common Octopus ... are not easily to be found in any pre-existing life form – it is plausible then to suggest they seem to be borrowed from a far distant "future" in terms of terrestrial evolution, or more realistically from the cosmos at large. Such an extraterrestrial origin as an explanation of emergence of course runs counter to the prevailing dominant paradigm.

Later the authors state the following, using "bolides" as a synonym for comets:

One plausible explanation, in our view, is that the new genes are likely new extraterrestrial imports to Earth - most plausibly as an already coherent group of functioning genes within (say) cryopreserved and matrix protected fertilized Octopus eggs. Thus the possibility that cryopreserved Squid and/or Octopus eggs, arrived in icy bolides several hundred million years ago should not be discounted (below) as that would be a parsimonious cosmic explanation for the Octopus' sudden emergence on Earth ca. 270 million years ago. Indeed this principle applies to the sudden appearance in the fossil record of pretty well all major life forms, covered in the prescient concept of "punctuated equilibrium" by Eldridge and Gould advanced in the early 1970s ...Therefore, similar living features like this "as if the genes were derived from some type of pre-existence" (Hoyle and Wickramasinghe, 1981) apply to many other biological ensembles when closely examined.

It is certainly an interesting idea that various “information explosions” or “complexity explosions” we see in the history of life might be explained by biological material coming from comets. And the 33 authors are quite right in hinting that such cases are inadequately explained by Darwin's theory of evolution, which offers only the explanation of random mutations and natural selection, one that is weak and unconvincing for reasons discussed here. An event such as the Cambrian Explosion in which we see the rather sudden appearance of most of the existing animal phlya (with so many new body plans appearing suddenly) is something that seems to be impossible to explain while you are confined by the straight-jacket of Darwinian orthodoxy. However, there are two very big problems in the type of theory suggested by the 33 authors.

The main problem has to do with the genetic code. The genetic code is the very specific system of representations used by all earthly life. It is not at all true that this genetic code follows inevitably from some laws of chemistry. The genetic code used by earthly organisms is only one of thousands of possible genetic codes that life might have been based on.

Amino Acid			Codons					
W	Trp	Tryptophan	TGG					
Y	Tyr	Tyrosine	TAC	TAT				
C	Cys	Cysteine	TGC	TGT				
E	Glu	Glutamic acid	GAA	GAG				
K	Lys	Lysine	AAA	AAG				
Q	Gln	Glutamine	CAA	CAG				
S	Ser	Serine	AGC	AGT	TCA	TCC	TCG	TCT
L	Leu	Leucine	TTA	TTG	CTA	CTC	CTG	CTT
R	Arg	Arginine	AGA	AGG	CGA	CGC	CGG	CGT
G	Gly	Glycine	GGA	GGC	GGG	GGT		
F	Phe	Phenylalanine	TTC	TTT				
D	Asp	Aspartic acid	GAC	GAT				
H	His	Histidine	CAC	CAT				
N	Asn	Asparagine	AAC	AAT				
M	Met	Methionine	ATG					
A	Ala	Alanine	GCA	GCC	GCG	GCT		
P	Pro	Proline	CCA	CCC	CCG	CCT		
T	Thr	Threonine	ACA	ACC	ACG	ACT		
V	Val	Valine	GTA	GTC	GTG	GTT		
I	Ile	Isoleucine	ATA	ATC	ATT			
X	STP	Stop codon	TAA	TAG	TGA			

The genetic code

So let us imagine that life appeared independently on different comets in our solar system. The life on each such comet would have its own genetic code. If life were to develop on a comet,

and that comet were to crash to our planet, such life would be using a genetic code entirely different from that of the earthly life that existed before. If there had been multiple collisions of life-bearing comets on Earth, what we would expect is a variety of organisms using different genetic codes. It might, for example, be that 50 percent of life used one genetic code, and 20 percent of life used some other genetic code, and 30 percent of life used some third genetic code. Or there might be ten different genetic codes used by earthly life. But that's not what we see. All life on Earth seems to use the same genetic code.

A writer named Gert Kortof states the problem in reviewing a book by Fred Hoyle:

Why is it a problem that the genetic code of the extraterrestrials and terrestrials should be the same? Is the code not necessarily derived from the laws of chemistry? No, it isn't! The genetic code is not a universal cosmic code. The problem with any theory that claims extraterrestrial genetic input, is that life on Earth is a closed genetic system. I strongly disagree with Hoyle's claim that ***"terrestrial biology is not a closed system"****. (p. 3) Why? All Life on earth happens to have the same genetic code. That would be no problem, if it would be the only possible genetic code available to life. Our genetic code is one of billions and billions of possible codes. The current one looks like a 'frozen accident'. The probability that the genetic code of extraterrestrial DNA is the same as the genetic code on earth, equals the chance that a Boeing-747 arises from a junk yard!*

Therefore it is very hard to believe that various comets on which life independently developed have seeded our planet with new life forms. If that had happened, it would not be true that all life uses the same genetic code. The issue of the genetic code is ignored by the paper by the 33 scientists.

A second problem is that comet collisions would be extremely destructive to earthly life. A comet impact would not be as destructive as an asteroid impact. But a larger comet might have so much kinetic energy that it might cause a mass extinction if it collided with our planet. A scientist says here that a collision with a kilometer-sized comet would probably mean the end of civilization. The chance of life on a comet surviving such an impact does not seem very great. It seems that a comet collision would be likely to destroy far more species than it added to our planet because of an addition of life from the comet.

Does this mean that the idea of extraterrestrial inputs to earthly biology should be discarded and dismissed? Not at all. There is a variation of this idea that gets around the genetic code problem and the collision problem. We can simply hypothesize that rather than being accidental, random inputs from comets,

the extraterrestrial inputs were deliberate inputs from intelligent extraterrestrial visitors.

Instead of life-bearing comets arriving at various times in the past, we can imagine life-bearing spaceships arriving here at various times in earth's history. Imagine if the beings populating an extraterrestrial expedition to our planet were to try to speed up the evolution of life on Earth. If such astronauts were to design new organisms to introduce on our planet, they would presumably create designs using the genetic code already used on our planet, rather than using some genetic code coming from their own planet (just as someone visiting Japan from England trying to spread ideas to the Japanese would create books written in Japanese rather than English). And of course, under such a spaceship theory the astronauts would not be smashing their spaceships into our planet, so you avoid the collision destruction problem. So by imagining a purposeful, directed introduction of new life forms into the Earthly biosphere, we have a “life from space” theory that avoids the two big problems of the theory of the 33 scientists.

But such a smarter theory might have been avoided by the 33 scientists on the grounds that it would be hard for a paper advancing such a theory to get published, given the current state of biological academia where there exists ideological restrictions that sometimes seem as great as those in a medieval monastery. For it is a great taboo in colleges and universities for anyone to be talking about purpose, design, and deliberate intent when trying to explain the origin of Earth's living things.

This taboo makes no sense at all. It is the taboo that when discussing the origin of incredibly fine-tuned biological organisms that look just like products of design and purpose, we must never suggest any explanation that involves some purposeful cause. It is the taboo that when discussing biological functionality more impressive than any electronic functionality man has produced, we must always pretend that all these biological innovations were mere accidents. And so our 33 scientists have given us a theory with two giant holes, huge problems that could have been avoided by simply imagining purposeful extraterrestrial visitations rather than purposeless extraterrestrial comet collisions.

Posted by Mark Mahin at 10:41 AM No comments:

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Wednesday, April 11, 2018

The Paltry Probability of Nearby Chance-Arising Humanoids

The Cosmic Zoo: Complex Life on Many Worlds is a recent book about the possibilities of extraterrestrial life. Written by Dirk Schulze-Makuch and William Bains, the book is mainly a look at earthly biology, with attempts to assure us that what we see on our planet isn't all that amazing, and that we should expect to see similar wonders all over the universe. On page 181 of their book, the authors make this Panglossian statement: "So if life arises on a distant exoplanet, it will also traverse the path from simple to complex, unicellular to multicellular, and produce intelligent animals capable of tool use in its forests and kelp beds, providing the planet is habitable long enough."

To promote such runaway optimism, the authors introduce a classification scheme attempting to categorize biological innovations. They maintain that biological innovations can be put into three categories: (1) the Critical Path model; (2) the Random Walk model; (3) the Many Paths model.

On page 5 the authors define the Critical Path model like this:

Each transition requires preconditions that take time to develop...Once the necessary preconditions exist on the planet then the transition will occur in a well-defined timescale. It is like filling up a bath tub; once you turn on the taps, the bath will fill up. It just takes time.

On page 5 the authors define the Random Walk model like this:

Each transition is highly unlikely to occur in a specific time step, and the likelihood does not change (substantially) with time. This may be because the event requires a highly improbable event to occur, or a number of highly improbable steps....Once life exists on a planet, ultimately the key innovation will occur, but when it occurs is up to chance, and whether it occurs before the planet runs out of time and becomes uninhabitable is not knowable.

The last sentence is rather confusing, because "ultimately the key innovation will occur" suggests inevitably, but the rest of the sentence

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► August (8)
► July (8)
► June (8)
► May (8)
► April (8)
► March (9)

suggests no inevitably at all. On page 9 they clarify that this Random Walk model refers to something that is "quite unlikely to occur."

On page 5 the authors define the Many Paths model like this:

Each transition or key innovation requires many random events to create a complex new function, but many combinations of these can generate the same functional *output, even though the genetic or anatomical details of the different outputs are* not *the same. So once life exists the chance that transition will occur in a given time period is high, but the exact time is not knowable.*

Later on page 9 they describe this Many Paths model like this:

There are no specific preconditions for a Many Paths process other that prior existence of life that can achieve the innovation. However, once any appropriate precondition is met, the innovation will happen fairly reliably some time afterwards (as measured in generations). So it it almost inevitable that the innovation will occur eventually. But because there are many ways that it can occur, then each time the function *will be carried out by a different* mechanism.

Throughout the book again and again the authors attempt to convince us that particular types of biological innovations that occurred on Earth were examples of a Many Paths process, and that we should therefore expect to see them commonly on other planets. The logic of the authors seems to be something like this: *when nature shows us there are many ways in which a particular biological innovation can be implemented, we can call this a Many Paths innovation; such innovations are pretty likely because there are many ways they can be implemented, not just one way.*

But such reasoning is very fallacious. To judge the likelihood of something, we should not merely consider whether there is only one way that it can be achieved, or many ways. We should instead consider the ratio between the outcomes that do not achieve such a result and the outcomes that do achieve such a result.

We can give a concrete example regarding vision systems, the biological systems that result in vision. In humans the vision system consists of 4 main things: (1) the eye; (2) an optic nerve stretching from the eye to the brain; (3) the visual cortex in the brain (a part of the brain that interprets visual inputs); (4) very complex and fine-tuned proteins such as rhodopsin that are used in vision, helping to capture light. On page 6 the authors submit this as an example of a Many Paths innovation. They state:

An example of the Many Paths Model is the evolution of imaging vision. Eyes that can make images of the world (not just detect light and dark) have evolved many times in insects, cephalopods, vertebrates, and extinct groups like the trilobites.

But you would be committing a great error in logic if you reasoned like the authors, and suggested that it is fairly likely that a vision

- February (7)
- January (8)

- 2019 (95)
- 2018 (93)
- 2017 (92)
- 2016 (92)
- 2015 (97)
- 2014 (163)
- 2013 (166)

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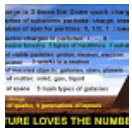
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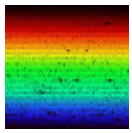
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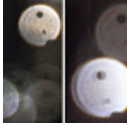
system would evolve, because there is not just one way to make a vision system, but lots of ways. A better line of reasoning would involve comparing the number of ways to arrange matter that do not result in functional vision to the number of ways that do result in functional vision. That would give you a ratio of more than 1,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000 to 1. From such a perspective the appearance of a vision seems fantastically unlikely.

It is fallacious to argue that something is relatively likely to occur because there are many ways for it to happen. Using such reasoning we might argue that there is a pretty good chance that tornadoes passing through a junkyard will one day assemble a car by chance, because there are many different ways to assemble a car from parts in a junkyard. Even though there are many types of automobiles, the number of arrangements of matter that do not result in automobiles is more than 1,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000 times greater than the number of arrangements that do result in automobiles. So the chance of an automobile appearing in such a way is incredibly low, despite there being many different ways to make a car.

Because we do not show some outcome is likely or show that it even has one chance in a trillion quadrillion of occurring by showing there are many ways to achieve the outcome, the classification scheme offered by the authors of *The Cosmic Zoo* is misleading, and should not be used. But is there some better way to classify biological innovations, some classification scheme that might shed a little light on the chance of them randomly occurring on other planets?

Let me sketch out such a classification scheme. The categories are below. The difficulty level refers to how hard it is for the biological innovation to occur by random mutations and natural selection.

Category Name	**Description**	**Example**	**Difficulty Level**
Category 1	A biological innovation requiring no major structural change	A biochemical change resulting in sun-protective dark skin rather than light skin.	Low
Category 2	A biological innovation requiring some small structural change which is repeated many times	Hair, which consists of thousands of repetitions of a single hair follicle	Moderate
Category 3	A biological innovation	Teeth. Each tooth provides a small	Moderate



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	requiring multiple small components which are either very simple and easy-to-achieve or complex but individually useful	benefit.	
Category 4	A biological innovation requiring multiple complex components, none of which by itself provides any benefit to the organism (no increase in survival value or reproduction)	A vision system, requiring eyes, an optic nerve, a light-interpreting visual cortex, and complex light-capturing proteins (all are useless unless all 4 components exist)	Fantastically improbable; vastly harder than Category 3

The difference between the difficulty of achieving biological innovations in Category 3 and Category 4 is an exponential difference, which we can colloquially describe as "all the difference in the world." I can give an exact numerical example to illustrate the difference.

Let us imagine that some biological innovation requires five complex components, each of which is individually useful once it occurred. If a species consists of a million organisms, it might be that there is (on average) only 1 chance in 100 of each of these components arising by chance in this population during a 50-million year period. But if each of these components is useful by itself, once such a component appears in the gene pool a "classic sweep" of natural selection might cause all of the organisms to get such an innovation after several generations. So over the course of 50 million years, the overall likelihood of the biological innovation occurring in the population might be only a little less than 1 in 100 to the fifth power, which equals 1 in 10 billion. Those are pretty steep odds, but not totally prohibitive odds.

But let us imagine that some biological innovation requires five complex components, each of which is *not* individually useful once it occurred, and each of which is not useful until all of the five components have appeared in a single organism. If a species consists of a million organisms, it might be that there is (on average) only 1 chance in 100 of each of these components arising by chance mutations in this population during a 50-million year period. But if each of these components is not useful by itself, once such a component appears in the gene pool there would not be any "classic sweep" of natural selection that might cause all of the organisms in the population to get such an innovation after several generations.

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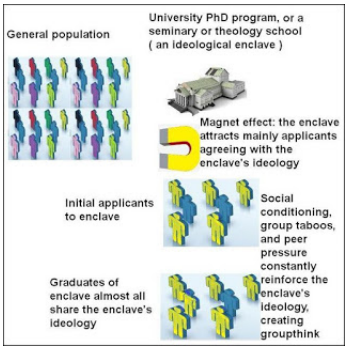

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- 3D printing (1)
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Now the math ends up being radically different. Imagine the first component arrives in the gene pool, and that such an arrival (at any time during the 50 million years) has a chance of 1 in 100. If the second component appears in the gene pool, it would need to occur in some member of the population that already had the first component; or else the second component would be wasted. The chance of this now is 1 in 100 multiplied by 1 in a million (actually less 1 in a million, because the first component, being useless by itself, would probably have disappeared from the gene pool before the second component arrived). So to get an organism with both the first and the second component, we have an overall likelihood of less than 1 in 100 times 1 in 100 times 1 in a million. The same math ends up applying to the third component, the fourth component, and the fifth. Overall the math looks like this for the probability of ending up (at any time during the 50 million year period) with a single organism with all of the five components required for the biological innovation (with the "1 in a million" coming from the size of this population):

Chance of first component appearing in gene pool per 50 million years: 1 in 100.
Chance of second component appearing during this period in an organism already having first component: 1 in 100 multiplied by less than 1 in a million.
Chance of third component appearing during this period in an organism already having first and second components: 1 in 100 multiplied by less than 1 in a million.
Chance of fourth component appearing during this period in an organism already having first, second, and third components: 1 in 100 multiplied by less than 1 in a million.
Chance of fifth component appearing during this period in an organism already having first, second, third, and fourth components: 1 in 100 multiplied by less than 1 in a million.

These are all independent probabilities, and to compute the overall likelihood of all of these things happening in this population during the 50 million years we must compute the first probability multiplied by the second probability multiplied by the third probability multiplied by the fourth probability multiplied by the fifth probability. This gives us an overall probability of less than 1 in 10 to the thirty-fourth power (less than 1 in 10,000,000,000,000,000,000,000,000,000,000.000). These odds can be described as being totally prohibitive. We would not expect such an event to occur even once in the history of the galaxy, even if there are billions of life-bearing planets in the galaxy.

Do we see any of these Category 4 innovations occurring in earthly history? Yes, we see them occurring rather often. One example is the appearance of a vision system. If we consider a minimal vision system consisting of several eye components, an optic nerve, a part of the brain specialized to interpret visual signals, and at least one fine-tuned light-capturing protein, then we have a system consisting of at least five or six components, all of which are necessary for vision.

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
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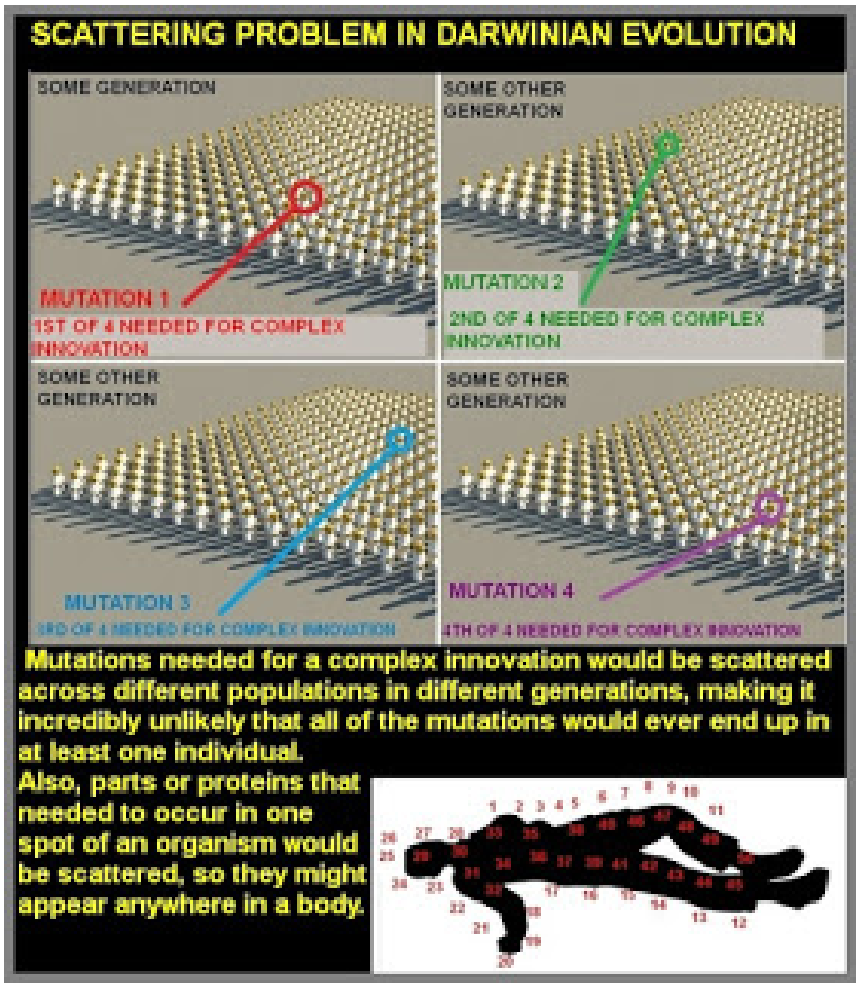
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

Numerous other examples could be given of such Category 4 innovations. If we consider only random mutations and natural selection, we should not expect such miracles of innovation to be repeated on any other planets in our galaxy. Natural selection (which creates a "classic sweep" causing the proliferation of a useful trait) makes Category 3 innovations more likely, but does nothing to make Category 4 innovations anything other than fantastically improbable.

I call this type of difficulty "the scattering problem." It is the problem that when we consider how the mutations needed for a complex innovation would (if they occurred) be scattered across the individuals of a population existing over multiple generations, it is exceptionally unlikely that all of the required mutations would ever end up in a single individual. This "scattering problem" rears its ugly head in every type of Category 4 innovation, in which the complex components needed for an innovation are not individually useful (meaning no "classic sweep" can occur until all of the components have appeared in a particular organism).



I can illustrate this scattering problem through an analogy. Let's imagine you're some "ahead of his time" genius who invented the first home computer in 1960. Suppose that this consisted of 7 key parts: a motherboard, a CPU, a memory unit, a keyboard, a monitor, a disk drive, and an operating system disk. If you were to mail one of these parts on 7 different days, sending a different part each day to the same person, there might be a reasonable chance that the person might put them all together to make a home computer. But imagine you did

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

something very different. Imagine you mailed each part in a different year, sending out the parts gradually between 1960 and 1965. Imagine also that each part was mailed to a person you selected through some random process (such as picking a random street and a random time, and asking the name and address of the first person you saw walking down that street) – a process that might give you any of a million people in the city you lived. What would be the chance that the parts you had mailed through such a process would ever be assembled into a single computer? Less than one chance in 1,000,000,000,000,000,000,000,000. The actual likelihood in this example is about 1 in a million to the seventh power, or 1 in 10^{42}.

It is comparable odds that a Darwinian process of random mutations and natural selection would constantly be facing in regard to complex biological innovations of the Category 4 type. If it luckily happened that there somehow occurred in a gene pool all of the random mutations needed for some biological innovation, such gifts would be scattered so randomly across the population and across some vast length of time that there would be less than 1 chance in 1,000,000,000,000,000,000 that they would ever come together in a single organism, allowing the biological innovation to occur for the first time.

The previous analogy involving computer parts serves well as a rough analogy of the scattering problem. To make a more exact analogy, we would have to imagine some parts distribution organization that persisted for many generations. Such an organization might send out one part of a complex machine in one generation, to a randomly chosen person in a city, and then several generations later send out another part of the machine to some other randomly chosen person in the city (who would be very unlikely to be related to the previous person); and then several generations later send out another part of the machine to some other randomly chosen person in the city; and then several generations later send out another part of the machine to some other randomly chosen person in the city. The overall likelihood of the parts ever becoming assembled into a machine with all the required parts would be some incredibly tiny, microscopic probability. This more exact analogy better simulates the scenario in which favorable mutations supposedly accumulated over multiple generations.

Is there any way to reduce the scattering problem when considering the odds of complex biological innovations occurring by Darwinian evolution? You might try to do that by assuming a smaller population size. However, assuming a smaller population size is very much a case of "robbing Peter to pay Paul." The reason is this: the smaller the population size, the smaller the chance that some particular favorable random mutation will occur in a gene pool corresponding to that population (just as the smaller the number of lottery ticket buyers in a lottery pool, the lower the chance of any one of them winning a multi-million dollar prize). So any reduction in the assumed population size should involve a corresponding reduction in the average chance of one of the favorable mutations occurring. The result will be that the

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

incredibly low probability of the biological innovation will not be increased.

In the calculations above, I don't even consider an additional aspect of the scattering problem: that the mutations needed for some innovation would be scattered not just over some vast length of time and not just over an entire population but also scattered in random positions of an organism (so, for example, some component needed for an eye would be far more likely to occur uselessly in some other spot such as a foot or an elbow). This consideration just shrinks the likelihood of accidental complex innovations by many additional orders of magnitude, making it billions or trillions of times smaller.

The previous calculations involved the probability of only one organism in a population ending up with some biological innovation. The probability of such a biological innovation becoming common throughout the population (so that most organisms in the population have the innovation) is many times smaller. Evolution experts say that a particular mutation will need to occur many times before it becomes "fixated" in a population, so that all organisms in the population have the mutation. I did not even factor in such a consideration in making the calculations above. When such a consideration is added to the calculation, we would end up with some probability many, many times smaller than the microscopic probability already calculated. Instead of a probability such as 1 in 10^{32} we might have a probability such as 1 in 10^{50} or 1 in 10^{100}.

Probability 1: Probability that the gene pool of some particular species will ever experience (possibly scattered in different generations and organisms) each of the random mutations needed for a complex "Category 4" biological innovation, in which there is no benefit until multiple required components exist arranged in a way providing functional coherence	Some particular probability
Probability 2: Probability that all of these mutations will exist in the gene pool during one particular generation (possibly scattered among different organisms)	Some probability only a tiny fraction of Probability 1
Probability 3: Probability that all of these mutations will ever end up in one particular organism, allowing the biological innovation to occur	Some probability only a microscopic fraction of Probability 1-- perhaps a million trillion quadrillion times smaller.
Probability 4: Probability that all of these mutations will ever end up in	Some probability many times smaller than Probability 3, and

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

most of the organisms in the population	perhaps billions of times smaller.

There is clearly a very strong basis for suspecting that something other than mere chance and natural selection was involved in all the biological innovation that occurred on Earth. Contrary to the naive claims of the authors of *The Cosmic Zoo*, if we use nothing but the explanations of orthodox Darwinists, we are left with bleak prospects for the existence of humanoid beings elsewhere in our galaxy. A more hopeful attitude would be appropriate only for someone willing to consider metaphysical and teleological considerations that might change the prospects dramatically. It would seem to make no sense for a SETI spokesman to be optimistic, unless he believes in cosmic teleology -- or unless he can specify some way in which non-humanoid extraterrestrials with a radically alien biology might appear without any of the ever-so-improbable Category 4 biological innovations occurring.

But an orthodox Darwinist will continue to argue along the lines of "Innovations that occurred multiple times must have had a high chance of occurring randomly." Below is a dialog that illustrates the fallacy in this type of reasoning. Let us imagine a conversation between a mother and a father, with a 3-year-old son.

Mother: That son of ours is learning a few things. I notice that he knows the channel of his favorite TV show, because I see him repeatedly pressing three buttons on the remote, and getting his favorite channel on the first try.
Father: No, that must be just *chance*. He's probably just randomly pressing number buttons on the remote. He probably accidentally gets the right channel often because there aren't that many channels.
Mother: Are you kidding me? I must have seen our son fifty different times press three numbers on the remote, and get his favorite channel on the first try. That proves it isn't just chance.
Father: Not at all. If our son got the right channel fifty different times, that just proves what I said – that there must be few TV channels, and that there's pretty good odds of him getting the right channel accidentally. Otherwise, he wouldn't have accidentally got his channel so quickly so many times.

The father's reasoning here is very much in error. Each additional time that the son presses three numbers on the remote and gets his favorite TV channel on the first try is actually an additional item of evidence arguing against the claim that blind chance is involved. If there are ten such cases, it argues strongly against the accidental success theory, and if there are fifty such cases, it argues much more strongly against the accidental success theory. The father has simply taken evidence against his theory, and tried to convert it into evidence for his theory. His statement that "otherwise, he wouldn't have accidentally got his channel so quickly so many times" commits the fallacy of overlooking the possibility that something other than chance is involved, and

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

assuming the truth of what the father is attempting to prove (an example of what is called circular reasoning).

Similarly, each additional occurrence of a vastly improbable biological innovation is not evidence that such innovations have accidentally occurred but are instead additional reasons for doubting the theory that such innovations are mere accidents. Similarly, if you are playing poker with a card dealer who very frequently deals himself a royal flush in spades, this doesn't show that it's easy to get by chance a royal flush in spades; it's simply a reason for suspecting that something more than chance is involved.

Posted by Mark Mahin at 9:41 AM No comments:

Labels: Darwinism, evolution, extraterrestrial life, natural selection

Monday, March 26, 2018

The Organization Explosions They Can't Explain

Last night on the National Geographic channel there was a science documentary discussing the origin of life. It was the typical misleading treatment of this topic I expect to see on a TV show or a mainstream source. There was the usual vastly overconfident talk suggesting scientists may be on the brink of solving the problem of life's origin, an entirely unfounded claim we have been hearing for 70 years. We also heard a scientist in front of a hot spring or hydrothermal vent saying, “This is where chemistry turns into biology.” No, it isn't. There could only be a case of chemistry turning into biology if chemicals were to turn into a living thing, something that hasn't happened on our planet for at least three billion years, in either nature or a laboratory. Chemistry does not turn into biology in hot springs or hydrothermal vents. As a recent scientific paper notes, "Independent abiogenesis on the cosmologically diminutive scale of oceans, lakes or hydrothermal vents remains a hypothesis with no empirical support."

The origin of life is a case of an organization explosion. The origin of even the simplest life seems to require a fantastically improbable burst of organization. Protein molecules have to be just-right to be functional. It has been calculated that something like 10^{70} random trials would be needed for a functional protein molecule to appear, and many such protein molecules are needed for life to get started. And so much more is also needed: cells, self-replicating molecules, a genetic code that is an elaborate system of symbolic representations, and also some fantastically improbable luck in regard to homochirality. Scientists have no plausible explanation for this organization explosion, nor do they have a decent explanation for another organization explosion: the Cambrian Explosion.

When we examine the fossil record, we don't see fossils appearing in larger and larger sizes, at an even rate of progression between 3 billion years ago and 100 million years ago. Instead, we see very little fossil

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

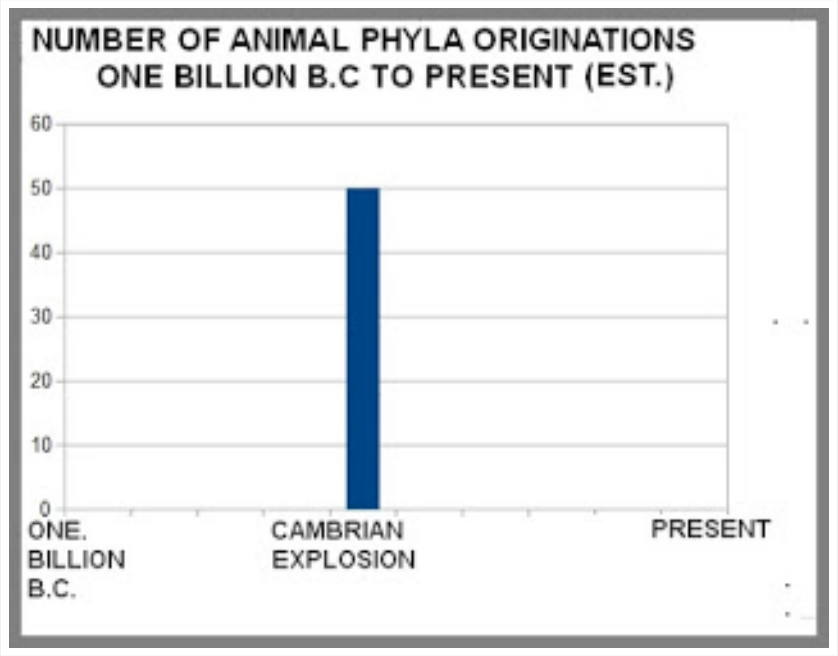
evidence of life prior to the Cambrian era about 520 million years ago. But during the Cambrian era there is a sudden surge of fossils in the fossil record. This sudden blossoming of life during the Cambrian era is known as the Cambrian Explosion.

The major groupings of life are called phyla. There are about 35 animal phyla, and almost all of these phyla appeared during the Cambrian era. There is not a single animal phylum that has arisen since about the time of the Cambrian era, which lasted from about 540 million years ago to 485 million years ago. As one research paper states, "The youngest animal phylum is about 500 million-year-old." This highly technical document states that Bryozoans are the youngest phylum of animal. The document states:

Bryozoans, or moss animals, make their first appearance in the fossil record about 490 million years ago. All other phyla had appeared by about 510 million years.

This creates quite a problem for Darwinian theory, as it is not what such a theory predicts. According to Darwinian ideas, what we should have seen is more and more phyla appearing as time progressed, as more and more branches appeared in a tree of life, like the tree of life that appeared as an illustration in *The Origin of Species*. In fact, Darwin said in *The Origin of Species* that the Cambrian Explosion "may be truly urged as a valid argument against the views here entertained."

We don't know how many animal phyla originated in the Cambrian Explosion, and estimates vary between 30 and 100. The graph below assumes an intermediate estimate of 50. A graph like this is startling, because it shows the origin of animal phyla in a single blip.



There have been various attempts to explain how the Cambrian Explosion could have occurred. One such attempt is the book *In the Blink of an Eye* by biologist Andrew Parker. The author's theory is summarized on the dusk jacket of the book:

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

Parker's astounding explanation is that it was the development of vision in primitive animals that caused the explosion. Precambrian creatures were unable to see, making it difficult to find friend or foe. With the evolution of the eye, the size, shape, color, and behavior of animals was suddenly revealed. Once the lights were "turned on," there was enormous pressure to evolve hard external parts as defenses and grasping limbs to grab prey. The animal kingdom exploded into life, and the country of the blind became a teeming mass of hunters and hunted, all scrambling for their place on the evolutionary tree.

The book calls this theory the "light switch" theory. What is this "pressure" referred to in this quote? It is what Parker calls "selection pressure." The concept of selection pressure is reasonably used when talking about microevolution, changes in a population that result simply from a state where some particular trait already present in the population is either favored or disfavored by the environment.

Here is an example. Imagine a population of 500 dogs is introduced in the wild to a very cold island in upper Canada. Some of the dogs may have short fur, and others may have thick fur like the Samoyed breed. In such a situation, you could say there is selection pressure that might cause the dogs with thick fur to become more common in the population over the next few generations (because the short-haired dogs might tend to freeze to death). This is an example of microevolution, which does not involve any new complex biological innovations. All of the examples in the wikipedia.org article on "evolutionary pressure" (the same as selection pressure) are mere examples of microevolution.

But Parker has hijacked the term "selection pressure," which is reasonable when talking about microevolution, and he is using it to try to explain sudden cases of biological innovation, what is called macroevolution. This is illegitimate. In no sense can we explain dramatic macroscopic innovations by using the phrase "selection pressure."

Let us consider the Darwinian account of how evolution occurs. We are told that new biological innovations are caused by lucky random mutations and natural selection. The idea is that over the eons there very rarely occur fortunate random mutations. We are told that natural selection causes favorable random mutations to accumulate, and that this results in useful new adaptions.

Such a Darwinian process will be at the mercy of how often these rare lucky mutations occur. Such a rate will not be sped up when there is a need for some particular innovation. If a biological innovation requires many parts before it can be useful – which is certainly the case for a vision system, hard shells, and grasping limbs – then there will be no natural selection at all until the innovation has reached a functional threshold, which requires quite a few parts arranged in a way that achieves a functional coherence.

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

Using the term "selection pressure" to try to explain such an innovation of macroevolution is nonsensical. There would be no natural selection at all until the innovation had become largely functional. And when there's no natural selection going on, there can be no selection pressure. It is absurd to use the word "pressure" to try to explain the natural origin of useful parts and their arrangement into functionally coherent systems. It would be just as absurd to say that if you are freezing in the woods, there will be a "habitation pressure" that will cause falling trees to form into a log cabin for your convenience.

For example, suppose there's a species that does not have wings, and is often preyed on by some predator. It is absurd to say that there is then a selection pressure pushing such an organism to turn into a flying organism that can escape the predator. Until the organism were to develop functional wings, there would no natural selection going on favoring wings. And when there's no natural selection favoring something, there cannot be selection pressure.

Parker's magic-wand phantasmagorical thinking about "selection pressure" is shown on page 6 of his book, where he says, without providing an example, "The introduction of a new food source may lead to the evolution of new mouthparts and limbs for movement." So if you're an animal that doesn't have a mouth or legs, and some other mobile animal starts to appear in your area, one that might be nice for you to eat, then evolution conveniently provides your species with a mouth and legs, like some Fairy Godmother providing Cinderella with just what she needed for the Prince's ball? That's hilarious.

In reality, Darwinian evolution will always be at the mercy of random mutations that will not cooperate based on needs, and which will always be fantastically unlikely to provide a species with new innovations that it might find useful. This is because virtually all random mutations are neutral or harmful, and it is fantastically unlikely that random mutations would conveniently occur in a way allowing parts to fit together, so that functional coherence was achieved. The need for some biological innovation would cause no change at all in the rate at which favorable random mutations would occur. Such favorable random mutations would be just as fantastically unlikely to occur when a species needed something as when the species didn't need anything. Similarly, there is no relation between your financial needs and the likelihood of you winning a million dollars by playing roulette at Las Vegas.

Below are some of the innovations appearing suddenly in the Cambrian explosion:

1. vision, appearing in species such as trilobytes;
2. various phyla that did not have protective shells;
3. body parts allowing moving about and attacking other organisms;
4. protective shells

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

You don't explain the first three of these under any “the lights turned on, so animals needed to protect themselves” idea, as it doesn't explain the first three things. Nor does it work to explain the appearance of protective shells by evoking Darwinian natural selection. Let us imagine the gradual evolution of a protective shell around the internal organs of some species like a primitive trilobyte. The first stages in such a protective shell would offer no benefit, because the organism's body would still be a mostly unprotected area that a predator could attack, like some shark munching on a swimmer who only had his wrists protected by steel bands. So there would be no natural selection benefit for the early stages of such an innovation. This is the same “non-functional intermediates” problem, which in Darwin's time was called the problem of incipient stages.

The problem of explaining the Cambrian Explosion is the problem of explaining the abrupt appearance of a wide variety of sudden biological innovations, including vision, which there is no fossil record of before the Cambrian Explosion. Parker cheats on such a task by offering an explanation that starts out with vision appearing, and then tries to use that to explain the other innovations. That's a cheat because his “light switch” theory doesn't explain the hardest part of the Cambrian Explosion, explaining the origin of vision.

The problem of the origin of vision is constantly minimized by evolutionary biologists, who try to reduce it to only being the problem of an eye developing. But there are 4 parts in even the most elementary vision system:

1. an eye
2. an optic nerve
3. extremely fine-tuned light-capturing proteins, fantastically unlikely to appear by random mutations
4. very complex brain changes needed to interpret visual input

So here we have a classic case of the problem that intermediates or incipient stages would be nonfunctional. For example, it would do a species no good if it had only a primitive eye but not the proteins needed to capture light, or only those proteins but not the primitive eye.

Parker's explanation for vision's origin is as featherweight as a photon. His explanation is basically: because there was a little more sunlight, vision appeared. On page 291 to 292 Parker states:

The first eye must have evolved in response to an increase in sunlight*...And indeed the geologists have revealed an increase in sunlight levels precisely at the very end of the Precambrian.*

He provides no reference for this claim, which is not true in any substantive sense. There is no geological way to tell how much sunlight there was 530 million years ago, and scientists in general assume that the sun does not suddenly change its output. The scientific paper here has a graph that shows an estimate of solar radiation during

the past billion years. We see no sudden increase at the time of the Cambrian Explosion about 530 million years ago.

The basic idea behind Parker's “light switch” theory in his *In the Blink of an Eye* book is a kind of “Fairy Godmother” concept of evolution. It's the idea that when species need something, evolution rather quickly provides them with wonderful new innovations, “in the blink of an eye,” like the Fairy Godmother providing Cinderella with the wonderful innovations she needed to go to the Prince's ball (or like the female character in *I Dream of Jeannie* blinking something into existence to benefit her astronaut master). Such a chimerical description is very much at odds with standard claims that evolution is driven by mere random mutations and natural selection. The rate at which incredibly unlikely favorable random mutations occur will have no relation at all to the needs of some species, and it should always be fantastically improbable that random mutations should occur in an organized way that conveniently matched the needs of some species.

Another lame explanation of the Cambrian Explosion involves saying that there was an increase in oxygen that allowed it. But you don't explain a fantastically improbable thing by merely mentioning that a prerequisite for it recently appeared. That's as fallacious as Bob's reasoning in the exchange below, which takes place in Joe's backyard.

Joe: How do you like my house of cards?
Bob: You must have made that by just throwing a deck of cards into the air.
Joe: You're crazy! That would never work.
Bob: But I have an explanation for how it happened: it's that today is a nice calm day. You never could have made that house of cards yesterday by throwing the deck of cards into the air, because yesterday it was too windy for that to work.

Bob has here committed the fallacy of trying to explain a fantastically improbable event by merely mentioning that a prerequisite for it occurred.

There's one other explanation I've read for the Cambrian Explosion. It's that we observe it because the Cambrian Explosion suddenly started making fossils that are big enough and hard enough for us to observe 500 million years later. That explanation is as lame as the young man's reasoning in the exchange below.

Old man: I've never seen anything very strange, except that 50 years ago I suddenly saw 40 huge monsters appear in a field.
Young man: The explanation is obvious. You saw them that day because they were so big. If they were just tiny monsters, you wouldn't have noticed them.

This type of explanation explains nothing.

There is also the rather laughable explanation suggested by one researcher, in an article entitled, "Cancer tumors could help unravel the Cambrian explosion." Talk about grasping at straws. Cancer is a disorganized cell growth, and such a thing does nothing to explain the incredible organization burst that occurs when a new phylum originates. In the article the author claims to have advanced a "new theory," but the scattered observations in the article never amount to a coherent hypothesis.

A more substantive idea is advanced in this paper, which tries to suggest that earthly evolution has been supercharged by comet bombardments carrying genetic material from beyond our planet. I'm rather skeptical that such an idea could help much with the Cambrian Explosion problem, but perhaps it could help plug other holes in the standard story of earthly life's evolution. The authors state the following, making an interesting comparison between prevailing Darwinian theory and the discarded theory of Ptolemaic epicycles:

In a final reckoning it would have to be admitted that ultimately all of evolution has been controlled and continues to be controlled by space-borne organisms, microbes and viruses. It is important that we not allow Science to be stifled by a reign of dogmatic authority that strives to restrict its progress along narrow conservative lines. The current situation is strikingly reminiscent of the Middle Ages in Europe – Ptolemaic epicycles that delayed the acceptance of a Sun-centred planetary system for over a century.

A question raised by their idea is: if you're going to imagine extraterrestrial life contributing to earthly evolution, then why not just try to explain the Cambrian Explosion by imagining a spaceship that came here and dropped off organisms specifically designed to live here, as I speculated in this post?

Postscript: One of the authors of a scientific study confirms that the appearance of the first animals (which the author dates to 541 million years ago) involved an information explosion. The author states this:

We discovered the first animal had an exceptional number of novel genes, four times more than other ancestors. This means the evolution of animals was driven by a burst of new genes not seen in the evolution of their unicellular ancestors.

The scientific paper gives specific numbers of new genes that appeared when specific groups of animals originated. For example, it lists 1580 novel genes needed for Bilateria to originate, 1201 novel genes needed for Planulozoa to originate, and 1189 novel genes needed for Metazoa to originate.

Interestingly, the New York Times covers this story with a headline "The Very First Animal Appeared Amid an Explosion of DNA," which sounds like my phrase "information explosion." Meanwhile panspermia.org refers to these novel genes by saying,"What we find remarkable is that neither the genes that

apparently predate animals, nor the novel ones noticed now... have any discernable darwinian provenance," meaning they are unexplained under Darwinian theory.

A 2019 study published in the journal *Nature* states, "Our results are consistent with the first animal cell being able to transition between multiple states in a manner similar to modern transdifferentiating and stem cells." The suggestion is that "the first animal cell" had a complexity and capability similar to today's cells, which makes the Cambrian Explosion even harder to explain under current ideas. This sounds like even more of an "organization explosion."

Posted by Mark Mahin at 10:53 AM No comments:

Labels: Cambrian Explosion, evolution

Sunday, February 18, 2018

Pinker's Fiery Manifesto Is Not So Enlightening

The new book by psychologist Steven Pinker is entitled *Enlightenment Now: The Case for Reason, Science, Humanism, and Progress*. I greeted this title with some wariness, having noticed long ago that people who claim self-righteously to be arguing for wholesome things such as “reason” or “science” or “progress” will very often be people who try to sell dubious ideas by sneaking them under the banner of “reason” or “science” or “progress.”

Pinker gives us a triumphalist account of scientific accomplishments, one filled with quite a few inaccuracies. He begins Chapter 2 very strangely by stating “The first keystone in understanding the human condition is the concept of entropy or disorder, which emerged from 19th century physics and was defined in its current form by the physicist Ludwig Bolzmann.” He refers here to the Second Law of Thermodynamics, but this is not at all a keystone in understanding the human condition, and has basically nothing to do with the human condition.

On page 17 Pinker claims, “One reason the cosmos is filled with such interesting stuff is a set of processes called self-organization, which allow circumscribed zones of order to emerge.” But no such process has been discovered, and Pinker doesn't specifically mention any such process. Theorists have been speculating about theories of self-organization for quite a while, but no one has come up with any substantial theory of self-organization explaining impressive degrees of functional order (although the term "self-organization" is sometimes applied to minor things we already knew about such as crystallization).

On page 18 Pinker makes the following claim:

Organisms are replete with improbable configurations of flesh like eyes, ears, hearts and stomachs which cry out for an explanation. Before Charles Darwin and Alfred Russel Wallace provided one in 1859, it was reasonable to think that they were the product of a divine designer....Darwin and Wallace made the designer unnecessary.

A claim like this has become an almost standard bromide in the books of a certain type of writer. Nowadays the writer of a certain type of book will not bother with giving us any reasons at all for thinking that Darwinism explains biological complexity. We will simply be told that Darwin took care of that by showing that a designer is unnecessary. Such a claim isn't merely a theological comment – it is a claim of enormous scientific accomplishment. Anyone claiming that someone showed that a designer of life is unnecessary is essentially making the claim that someone solved the riddle of biological complexity. What we have in such books is a simply an appeal to a dubious legend, like someone telling us that Woodrow Wilson made the world safe for democracy. There are several reasons why this claim about Darwin and Wallace does not stand up to scrutiny.

The first reason is that Darwin and Wallace did nothing at all to explain the origin of life itself. The first living thing must have been something of very high biological complexity and organization. But the theory of natural selection does nothing to explain the origin of life. Natural selection cannot occur until life already exists.

The second reason is that Darwin and Wallace never even learned about much of the most complex functionality in living things. Darwin knew nothing about the complexity of cells. We now know that cells are so complex they are like miniature cities. Darwin and Wallace also knew nothing about the intricacy of proteins – fantastically fine-tuned structures the origin of which is the most difficult unsolved problem. And Darwin and Wallace knew nothing at all about the genetic code, one of the hardest aspects of biology to explain. So how can any reasonable person claim that such things are explained by anything written by Darwin and Wallace back in the nineteenth century? That's like claiming that Aristotle and Plato explained the workings of digital computers.

The third reason is that Alfred Russel Wallace very explicitly stated that the theory of natural selection he helped pioneer was not adequate to explain the human brain. In an essay containing many similar comments, Wallace stated the following: "Natural Selection could only have endowed savage man with a brain a little superior to that of an ape, whereas he actually possesses one very little inferior to that of a philosopher." Clearly in light of the quote above, Pinker has no business citing Wallace as someone who “made the designer unnecessary.”

The fourth reason is that the theory of natural selection does not actually explain the origin of biological complexity or the origin of species. This is made clear in the book *Evolution and Ecology: The Pace of Life* by Cambridge University biology professor K. D. Bennett. Referring to speciation (the origin of species), this mainstream authority says on page 175, "Natural selection has been shown to have occurred (for example, among populations of Darwin's finches), but there is no evidence that it accumulates over longer periods of time to produce speciation in the Darwinian sense."

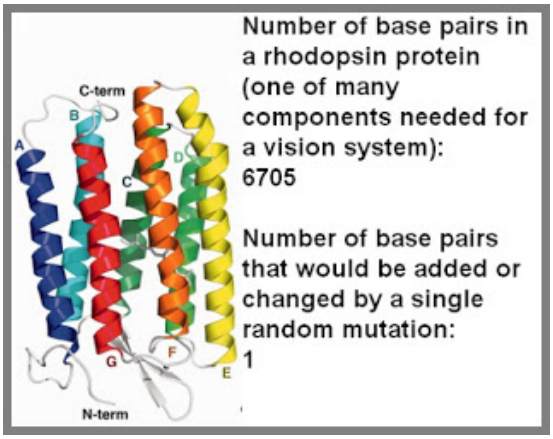
Pinker tries to give a Darwinian explanation for biological complexity by giving us this concise explanation on page 19:

Since no copying process is perfect – the Law of Entropy sees to that – errors will crop up, and though most of these mutations will degrade the replicator (entropy again), occasionally dumb luck will throw one up that's more effective in replicating, and its descendants will swamp the competition. As copying errors that enhance stability and replication accumulate over the generations, the replicating system – we call it an organism – will appear to have been engineered for survival and reproduction in the future, though it only preserved the copying errors that led to survival-of-the-fittest and reproduction in the past.

The “copying errors” he refers to may be more concisely referred to as typos. Pinker has tried to explain the mountainous levels of organization in biological systems by suggesting that they are merely an accumulation of typos. This is not a reasonable explanation. We cannot explain mountainous amounts of organization by merely using a theory of accumulation that is not a theory of organization. People who claim that accumulations of random changes can produce dazzling engineering effects are typically people who know nothing about engineering, and who have never accomplished any type of complex engineering.

A very important point is that Pinker is absolutely wrong when he says this about a random mutation: “occasionally dumb luck will throw one up that's more effective in replicating, and its descendants will swamp the competition.” Visible biological innovations that improve an organism's chance of survival could only occur through mutations if very many mutations occurred in a way to achieve a coordinated effect. We would never expect that to happen by chance. A single lucky mutation (corresponding to a single nucleotide change in DNA) would never produce any complex visible innovation that improved an organism's survival value or chance of reproduction, just as a single typed letter would never upgrade a software program. Visible biological innovations that improve survival value require very large amounts of information as complex as some

organized text consisting of thousands of letters; and the more complex the innovation, the more new functional information is required. The visual below gives an example.



You can realize this point by considering a random text generator that appends random characters to some text. Could it be that there would be some random letter added to the text would make the text more likely to achieve functionality or excellence? Not at all. It requires coordinated combinations of letters to add functionality to some text. Each mutation would be merely like some random alphabetic letter added to a text -- not something leading to a greater chance of reproduction or survival.

As A.N. Wilson points out on page 253 on his recent biography on Darwin, "There has never been a coherent explanation of the emergence of highly complex life forms." Wilson points out that most available copies of *The Origin of Species* are the first edition, rather than the sixth edition in which Darwin expressed many doubts and qualifications. We are thus hidden from the reality that "Darwin himself, doughty as a warrior for his theory, nevertheless had many moments of doubting it or (which is different) of not seeing how it could be defended," as Wilson states on page 256.

Continuing his triumphalist tall tales, on page 21 Pinker makes this very untrue claim: "A momentous discovery of 20th-century theoretical neuroscience is that networks of neurons not only can preserve information but can transform it in ways that allow us to explain how brains can be intelligent." To the contrary, there is no understanding at all of how a brain could possibly be generating intelligence, nor is there even any solid proof that neurons can store learned information.

We know the type of test that would be done to prove that learned information was stored in a neural system. One scientist might train some animals to learn something or receive some sensory input. Then some other scientist might dissect that animal's brain, trying to learn from the brain exactly what information was taught to the animal when it was alive. No such test has ever succeeded. It has absolutely not been proven that

neurons have ever preserved information that was taught to any animal subject.

Pinker's triumphalist tall tales continue on page 385 where he quotes a bogus brag by physicist Sean Carroll, who claimed that the laws of physics underlying everyday life are “completely known.” Pinker says, “It's hard to disagree that this is 'one of the greatest triumphs in human intellectual history.'” But there is no basis other than egotism and hubris for claiming that the laws of physics underlying everyday life are completely known. Future physicists will look back on such a statement with scorn. As discussed here, we don't even understand why the space surrounding us isn't vastly denser than steel as predicted by quantum field theory, which predicts a cosmological constant at least 10^{60} times greater than the one we observe.

Very strangely, on page 356 Pinker tells us this: “Professing a belief in evolution is not a gift of scientific literacy, but an affirmation of loyalty to a liberal secular subculture as opposed to a conservative religious one.” He rather seems to be suggesting that being a good Darwinist is not mainly about the science, but about some sociological act of affirming your loyalty to a subculture. This does not help the case he is trying to make.

On page 426 Pinker states, "Nor are the computational and neurological bases of consciousness obstinately befuddling." But no one understands or can explain any neurological or computational explanation for consciousness. Pinker again and again claims that he and and colleagues understand deep things that they do not at all understand.

In his zeal to support an atheistic world view, Pinker sometimes gets his facts mangled. On page 438 he asks, “Why is the world losing its religion?” No such thing is currently happening (as the polling data here makes clear). In a comment that reminds us of the recent “s***holes” statement reportedly made by Donald Trump, Pinker states on page 438, “Many irreligious societies like Canada, Denmark and New Zealand are among the nicest places to live in the history of our kind....while many of the world's most religious societies are hellholes.” He has his facts very wrong in referring to Canada as an irreligious society, and the wikipedia article on Canada tells us that 67% of the people in that country are Christians. We also learn from wikipedia.org that only 41% of the people in New Zealand report having no religion. I may note the inhumanity of referring to anyone's country as either a “s***hole” or a hellhole.

This comment about religious societies being hellholes epitomizes Pinkers treatment of anyone believing anything religious. All such people are very darkly portrayed in Pinker's book as fools and stumbling blocks to progress – as people who believe purely on faith rather than evidence. Although he

mentions some things that are very substantial reasons why someone might have a religious belief (the sudden origin of the universe in the Big Bang, cosmic fine-tuning and near-death experiences), Pinker seems absolutely incapable of realizing that people might actually believe something religious based on substantial evidence reasons.

Pinker claims this on page 394-395: “We know that the laws governing the physical world (including accidents, disease and other misfortunes) have no goals that pertain to human well being....By exposing the absence of purpose in the laws governing the universe, science forces us to take responsibility for the welfare of ourselves, our species, and our planet.” These are very misleading statements. They imply that the laws of physics are indifferent to humans. This is not at all correct.

Instead, in recent decades many scientists have extensively discovered that our existence depends in many ways on such laws. For example, modify in a rather slight way the laws of nature involving the strong nuclear force binding the nucleus of an atom, and humans could not exist. Change the laws of electromagnetism a little bit and the chemistry allowing life could not exist. Change the electric charge on either the proton or the electron by a tiny bit, and there would no longer be an exact precise equality between the absolute magnitude of the proton charge and the electron charge. The result would be that the electromagnetic repulsion between particles would overwhelm the gravitational attraction between them, and planets could not hold together. It is just as if the laws of physics were specifically created with the eventual existence of humans in mind. See here for additional examples.

In recent decades, scientists have very widely acknowledged and discussed the fine-tuning in the laws of nature and the universe's fundamental constants – something that first came to public light because of the papers and books of scientists themselves. By claiming that science has exposed “the absence of purpose in the laws governing the universe,” Pinker is simply making up a fairy tale that is pretty much the exact opposite of the truth. On page 423 Pinker himself says this about the universe's fundamental constants: “If any of these constants were off by a minuscule iota, then matter would fly apart or collapse upon itself, and stars, galaxies, and planets, to say nothing of terrestrial life and *Homo sapiens*, could never have formed.”

Pinker states this on page 422:

Memoirs from oxygen-starved patients who experienced their souls leaving their bodies could contain verifiable details unavailable to their sense organs. The fact that these reports have all been exposed as tall tales, false memories, overinterpreted coincidences and cheap carny tricks

undermines the hypothesis that there are immaterial souls which could be subject to divine justice.

Pinker refers here to near-death experiences. The typical near-death experience does not involve oxygen deprivation. And the "fact" that Pinker refers to is no fact at all. It is certainly not true that all near-death experiences have been exposed as "all tall tales, false memories, overinterpreted coincidences and cheap carny tricks," nor is it true that even a majority or a large fraction of such accounts have been shown to be such a thing. To the contrary, as discussed here there are many near-death experiences in which people reported medical resuscitation details that occurred while they were unconscious with stopped hearts -- details that were compared to what happened, and found to be true. Such corroborated accounts are indeed "verifiable details unavailable to their sense organs." We may note the remarkable untruth of Pinker's claim that the set of such accounts (in which people often report their souls floating out of their bodies) "undermines the hypothesis that there are immaterial souls." Someone might as well claim that observations of bears mauling humans undermines the hypothesis that bears exist.

In trying to shame and stigmatize those who have near-death experiences, Pinker is using the same type of tactic that would be used by a lawyer of a serial sex abuser -- try to cross out the large number of witnesses by claiming they're all confused or liars or people with "false memories." In this case there are too many witnesses and too much corroboration for such a tactic to work.

Obviously Pinker has made no serious study of paranormal phenomena, for on page 428 he ignorantly lists as an argument against the existence of a soul that it "falsely predicts the existence of paranormal phenomena." To the contrary, there is very strong evidence for a wide variety of paranormal phenomena, including extremely strong evidence gathered by psychologists at universities under laboratory conditions or by the US government (see here, here and here and here for examples).

To try to account for the universe's fine-tuning, Pinker evokes the multiverse, the idea that there is some vast collection of universes. This actually does nothing to explain our universe's fine-tuning, for the reasons discussed here. But Pinker thinks that imagining some vast set of a billion trillion quadrillion quintillion universes is *simpler*. He says on page 425, "The multiverse is the *simpler* theory of reality, since if our universe is the only one in existence, we would need to complicate the elegant laws of physics with an arbitrary stipulation of the universe's parochial initial conditions and its parochial physical constants."

Thus is the twisted “Bizzaro world” of Steven Pinker's logic. According to Pinker, since we find that there are all kinds of physical laws and physical constants extremely fine-tuned to allow the existence of living creatures such as us, this is something “exposing the absence of purpose in the laws governing the universe.” According to Pinker, if thousands of people all over the world report experiencing their souls drifting out of their bodies when their hearts stopped, in vivid near-death experiences, that is something that “undermines the hypothesis that there are immaterial souls.” And according to Pinker, if we try to explain away cosmic-fine tuning by imagining that there is a multiverse of 1,000,000,000,000,000,000,000,000,000,000 other universes, such an assumption has the advantage of making things “simpler.” Such weird reasoning is baffling and topsy-turvy.

Posted by Mark Mahin at 11:21 AM No comments:

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Sunday, November 5, 2017

Their "Darwin's Aliens" Aren't Really That

Recently a scientific journal published a paper entitled "Darwin's Aliens" that was a strange inconsistent mishmash with highfalutin pretensions. The authors claimed in their synopsis that they would "show how evolutionary theory can be used to make predictions about aliens." But their paper is an odd blend of orthodox recitations from the Darwinist catechism, statements that conflict with Darwinist claims, misleading graphics, and discussions of marvelous cooperation and sudden transitions that are non-Darwinian or in conflict with Darwinian ideas.

The paper starts out by discussing Darwin's theory of natural selection, but the diagram it gives to illustrate the idea is misleading. We see three animals, one of which has a tiny neck, the other a medium-sized neck, and the third with a long neck like a giraffe. These are given as examples of "variation." There's some lines under the long-neck giraffe, labeled "differential success," leading to three similar animals with very long necks.

This visual gives the completely erroneous idea that you might see some huge beneficial change in the structure of an organism due to some random variation within a generation. That is untrue. If there were a horse-like species with a small neck, it would need very many muscle and bone changes to become an animal with a long neck like a giraffe – not merely many changes in the neck, but changes in the main skeletal structure to support such a neck. It could never be that some random mutation or variation within a generation would cause such a change. You would need many random mutations across multiple generations, all coincidentally conspiring to achieve the same end – something vastly harder to account for than what is shown in the visual the paper provides. The paper's visual is a kind of visualization of the discredited idea of "hopeful monsters" (also called saltations or macromutations), which many evolution experts have rejected as unrealistic, and which is inconsistent with the Darwinian slogan that "nature does not make leaps."

The paper occasionally states some standard Darwinist dogma, such as the claim that natural selection can produce design without a designer,

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something that has not actually been demonstrated as we have no proof that any complex visible biological innovations have been produced by natural selection. And why should we be so eager to believe in design without a designer, like someone believing that the cooking he is served comes from no cook, or that the heat in his apartment comes from no heat source? What is the intellectual virtue in believing that nature is some huge counterfeiter, that has engaged in some gigantic fake-out by making all these thing that look like designs, but are not? You cannot answer with some anti-theistic answer, seeing that you could still postulate a design source for some earthly organism by imagining extraterrestrial visitors as the design source.

The paper contradicts its earlier claims about natural selection and design by stating that "The theory of natural selection itself is silent about whether complexity will arise." How's that? If natural selection actually could produce design (which is functional complexity), then how could natural selection be silent about whether complexity will arise?

The paper then considers the origin of complexity. It attempts to argue that complexity increases during "major transitions," an idea that is pretty vacuous. For example, if simple cells evolved into far more complex eukaryotic cells, or one-celled life evolved into multi-cellular life, those would be "major transitions," but by classifying them as major transitions we are not shedding any light on how such things happened.

The paper also suggests the idea that complexity increases when there is an "alignment of interests." The authors speak rather like someone describing soldiers selflessly enlisting or September 11th volunteers selflessly sacrificing their individual interests for the common good, in some altruistic way. The paper states this:

For example, the evolution of multicellularity involved a transition from an entity with one part (the single-celled organism) working for the success of itself, to an entity with many parts (the multicellular organism), working for the success of the whole group. The cells can now have very different functions (a division of labour), as each is just a component of a multicellular machine, sacrificing itself for the good of the group, to get a sperm or egg cell into the next generation....The rise in complexity on Earth has been mediated by a handful of such jumps, when units with different goals (genes, single cells, individual insects) became intricately linked collectives with a single common goal (genomes, multicellular organisms, eusocial societies)...Major transitions involve the original entities completely subjugating their own interests for the interests of the new collective. This represents an incredibly extreme form of cooperation.

You will be excused for having a big chuckle while reading this excerpt, which is kind of a sociological-sounding attempt to explain biological organization. Unlike human beings with minds, cells don't have individual goals, interests, or self-interest drives, and don't nobly

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► January (8)

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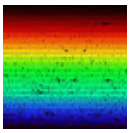
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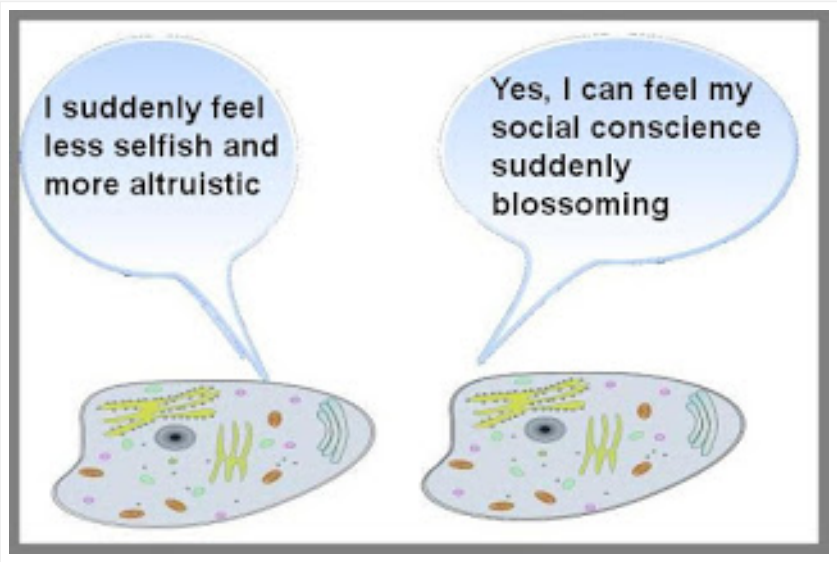
engage in self-sacrifice. We cannot explain cells entering into fantastically more organized systems as some form of altruistic loss of selfishness, similar to that of volunteers joining up to form a search party looking for lost mountain hikers, or a soldier volunteering to join an army. What we have here is a kind of fallacy of personification, as when the authors say, "Complexity requires multiple parts of an organism striving to the same purpose."



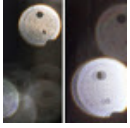
Not a good explanation for biological organization

Even if there were to be some noble self-sacrifice among cells, that still wouldn't explain biological organization. You may nobly join an army for the common good, but there's always higher planners who come up with a plan, and direct the volunteers into particular functions, telling one volunteer to fly a plane and fight at some location, and another to become an infantryman and fight in some other location. If we had a trillion volunteer self-sacrificing cells, how would we account for their organizational orders directing them to so many different complex specific purposes, according to such intelligent plans?

We may also note that what the authors are talking about sounds like cooperation, goals and purpose within nature, and there's nothing Darwinian about that. Darwin was constantly emphasizing the opposite idea of the "struggle for existence," in which life is always at war with other life in a dark purposeless struggle. I think the authors have given a title of "Darwin's Aliens" to ideas that are largely non-Darwinian, like a Chinese leader in 1980 saying, "Let's do something very Marxist and Maoist: we'll let people own their businesses, own their apartments, and let many of them become millionaires."

In their conclusion, the authors (claiming to be using "evolutionary theory to make predictions about extraterrestrial life") say that "complex aliens will be composed of a nested hierarchy of entities, with the conditions required to eliminate conflict at each of those levels." But this cannot be claimed as something that Darwinism predicts about alien life.

Life on our planet is organized in an extremely hierarchical way, with the hierarchy going from organelles to cells to tissues to organs to



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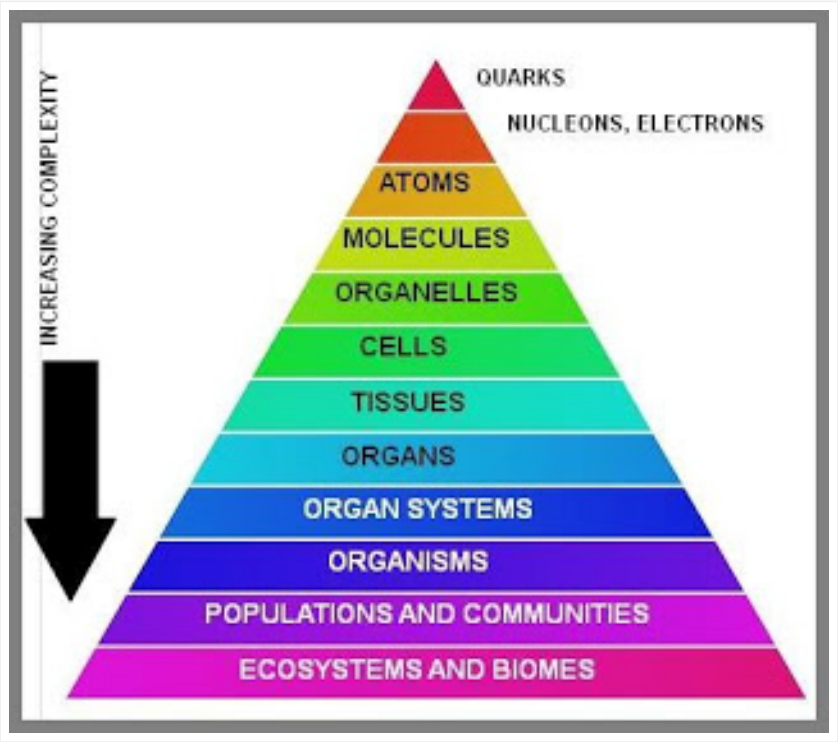
organ systems to organisms, as shown in the diagram below.



But such hierarchical organization is a thorn in the sign of Darwinism, which does nothing to explain it. Darwinism is not a theory of organization, but merely a theory of accumulation (that life evolves when favorable variations or mutations accumulate). Organization is something vastly more complicated and hard-to-explain than accumulation. A heap of auto parts in a junkyard is an example of accumulation; your car parked in the junkyard parking lot is an example of organization. As an evolutionary biologist confessed recently, referring to the "modern synthesis" that is Darwinism combined with genetics, "Indeed, the MS [modern synthesis] theory lacks a theory of organization that can account for the characteristic features of phenotypic evolution, such as novelty, modularity, homology, homoplasy or the origin of lineage-defining body plans."

We can actually imagine a type of alien life-form that would be the most compatible with Darwinian theory. It would be some life form that might have appeared because of gradual accumulations. For example, we can imagine some ocean life form consisting of a giant blob of cells. It might be the size of a dolphin, but consist only of a blob of tiny little units, kind of like the type of rock that is called a conglomerate, and merely consists of an accumulation of little pebbles. There would be no organized body plan like we see in typical mammals, the type of thing so hard-to-explain under Darwinian assumptions. Such an organism would not at all consist of a "nested hierarchy of entities." We can imagine an organism simply starting out as one tiny little unit, and then simply growing bigger and bigger as more of these units appeared.

Such an organism would have no organ systems and no appendages, both of which are very hard to account for using Darwinian explanations. The problem is that the first tenth of an appendage or the first tenth of an organ system will always be useless, and Darwin

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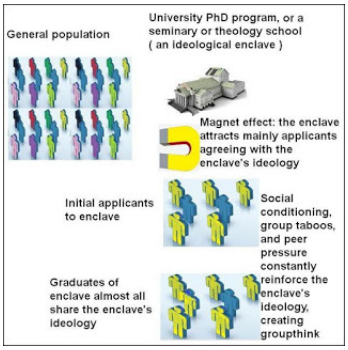

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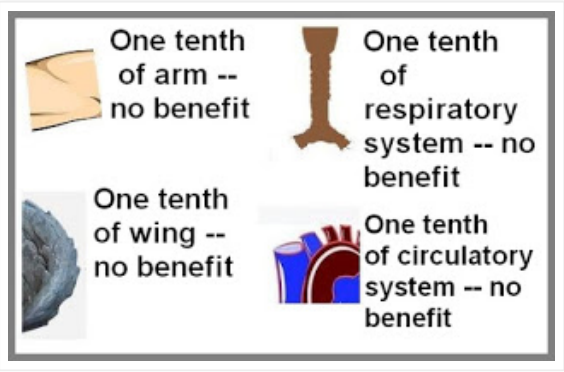
assured us that nature is always discarding useless variations or mutations; hence the difficulty of explaining how a useless tenth could ever evolve into a functional unit by Darwinian natural selection.



Interestingly, there are very few earthly organisms with such a simple arrangement, even though we can imagine 1001 relatively easy ways for large-scale life to progress to such simple arrangements. The only examples I can think of are jellfyish and sponges, which are pretty simple from a structural standpoint. It is as if earthly life was following some law of maximum complexity, almost always having an arrangement the *least* likely to be explicable through very simple ideas such as natural selection.

The authors give an illustration of a hypothetical creature they call the octomite. Was this some organism that resulted from a computer experiment they did, an experiment simulating evolution? No, it is merely an imaginary organism they drew (or had drawn) rather like kids doodling a monster picture during a boring class. But that's fine. When a science paper is speckled with dubious logic, it's a nice improvement to add a cool drawing of an imaginary alien creature.

Their imaginary creature has about 12 appendages protruding out of its thorax. Since appendages are hard-to-explain by Darwinian explanations, for the reason previously given, their imaginary organism is exactly not what we should be calling one of "Darwin's aliens."

Posted by Mark Mahin at 8:32 AM No comments:

Labels: evolution, extraterrestrial life

Saturday, September 9, 2017

The Fallacies of Dawkins' "Climbing Mount Improbable"

Richard Dawkins' book *Climbing Mount Improbable* is a book trying to persuade you that blind Darwinian evolution (evolution caused by natural selection and random mutations) produced pretty much all the biological complexity we see in the world. The book is centered around a mountain-climbing analogy. In this analogy, reaching some height of biological complexity is portrayed as something like climbing a mountain. The book assures us that Darwinian evolution is able to climb "even the most precipitous heights" because it takes the "mildly sloping paths" rather than the hardest steepest path up the

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

mountain. These paths Dawkins describes (on page 73) as "gently inclined grassy meadows, graded steadily and easily towards the distant uplands." He tells us on page 77 that Darwinian evolution works by "going round the back of Mount Improbable and crawling up the gentle slopes."

This is a very poor analogy – an inappropriate metaphor. The appearance of a new type of macroscopic organism involves all kinds of complex parts appearing on the scene in an incredibly intricate and coordinated way, so that great functional coherence is achieved. But climbing a mountain does not involve any type of event in which complex parts are assembled. Climbing a mountain doesn't even involve complexity. So mountain climbing is a terrible analogy for achieving some stunning wonder of coordinated biological complexity.

We can imagine all type of analogies that would have been more appropriate for describing blind processes producing complex biological structures. One such analogy would be the idea of trees in a forest luckily forming into a log cabin, or stones randomly forming into a stone house. But such analogies would throw unwanted light on the difficulties of random processes forming coherent structures. So rather than using such an analogy, Dawkins has chosen an inappropriate analogy that seems to have been chosen purely for its rhetorical advantages.

In this sense he's followed in the same steps as Darwin, who gave us the inappropriate metaphor of "natural selection," a term suggesting incorrectly that nature chooses things. The metaphor is not literally accurate, because strictly speaking only conscious agents choose things. The idea of survival of the fittest can be stated without a metaphor by using either the term "survival of the fittest" or "differential reproduction." So why did Darwin make such use of the metaphorical term "natural selection"? Probably for the same reason Dawkins has chosen a mountain-climbing analogy: for rhetorical advantage. Once a person has been persuaded that the evolution of incredibly complex machine-like functionality is like mountain-climbing, the same person might be persuaded that such an end was easily achieved by "walking up the easy back route," because there are often "easy back routes" leading to mountain tops. But since mountain-climbing doesn't involve even the simplest combination of parts, you are deluding yourself if you think that this mountain-climbing analogy is suitable for describing the appearance of wonderfully coordinated biological machinery.

On page 77 of the book, Dawkins tries to suggest that Darwinism is not a theory of chance. He says, "It is grindingly, creakingly, crashingly obvious that if Darwinism were really a theory of chance, it couldn't work." But, of course, Darwinism *is* a theory of chance, the claim that the combination of blind chance mutations and natural selection is enough to produce the origin of new species. As Dawkins says on page 80, "One stage in the Darwinian process is indeed a chance process – mutation." So on one page he talks as if Darwinism

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

isn't a theory of chance, and a few pages later he's talking as if it is just that.

Dawkins admits on page 81 that mutations usually have bad effects, not good effects. That is a severe understatement, and a more candid statement would have been to say that for every mutation that is helpful, there are hundreds or thousands that are harmful.

On page 96 Dawkins tries to suggest the idea of macromutations, that a single mutation can cause a huge change in an organism. He asks, most ridiculously, "Couldn't the elephant's trunk have shot out in a single, giant step?" We know why he wants to suggest this old "hopeful monsters" idea. If macromutations can occur, then rather than have to believe that lots of favorable mutations were needed for some biological innovation (something incredibly unlikely to occur by chance), we can believe that in some cases a favorable innovation arose from a single macromutation.

But the evidence Dawkins gives in support of the idea of macromutations is rather laughable. He states this on page 96:

Macro-mutations do happen. Offspring are sometimes born radically, monstrously different from either parent, and other members of the species. The toad in figure 3.2 is said by the photographer, Scott Gardner of the Hamilton Spectator*, to have been found by two girls in their garden in Hamilton, Ontario. He says that they put it on the kitchen table for him to photograph. It had no eyes at all on the outside of its head. When it opened its mouth, Mr. Gardner said, it seemed to become more aware of its surroundings.*

This is laughable as evidence. The photo he shows is a mutant frog that apparently has no eyes. Inside the frog's mouth are two little round things that could be anything – maybe eyes, or maybe something the frog ate, or maybe two marbles the two girls put in the frog's mouth. The second-hand claim that the frog "seemed to become more aware of its surroundings" when it opened its mouth is laughable from an evidence standpoint. There are, in fact, no known cases of a proven macromutation that ever produced a useful new feature (visible to the eye) in a biological organism. Dawkins' frog anecdote smacks of desperation. Why he is citing some story in the Hamilton Spectator rather than citing a scientific journal? Darwinist biologist Jerry Coyne says this about macromutations:

Macromutationism is the idea that important evolutionary changes between groups were produced by single mutations with very large effects....The notion of macromutationism pops up every few years in evolutionary biology. It's wrong but it's resilient.

Two scientists have noted, "In fact, to our knowledge, no *macromutations* ... that gave birth to novel proteins have yet been identified."

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

Referring to the fossil record, on page 106 Dawkins makes the damaging admission that "Transitional forms are generally lacking at the species level." Why should there not be a vast abundance of transitional forms in the fossil record if Darwinian theory is correct?

One of the great difficulties in natural history is explaining the origin of flight, where we have the wing-stump problem. For flight to have appeared, a transitional species would presumably have to have had a mere wing stump. But wing stumps are not at all useful, so we cannot explain the appearance of such a thing by saying that it provided some survival benefit.

On page 115 Dawkins starts trying to defend the idea that there is an "easy back path" by which Darwinian evolution could produce flying species. He says, "One possibility is that true flight grew out of the habit of gliding between trees, which lots of animals do, even if they don't quite fly." On page 118 he suggests that it would have been easy for gliding to evolve:

In none of these cases is there any difficulty in finding a gentle path up Mount Improbable. Indeed, the fact that the gliding habit has evolved so many times testifies to the ease with which these mountain paths can be found.

This type of reasoning is very common among orthodox Darwinists, but it is fallacious. The reasoning goes like this: it must be easy for blind evolution to produce Capability X, because Capability X has appeared numerous times in nature. Such reasoning is fallacious because we have no way of knowing how many occurrences were produced by a particular type of process that originated biological complexity. Consider these possibilities:

Possibility 1: Species have originated merely through natural selection and random mutations.
Possibility 2: Species have originated through the action of some mysterious cosmic life-force or cosmic programming that acts throughout the universe as an organizational principle.
Possibility 3: Species have originated because extraterrestrial spaceships have periodically arrived and planted new life forms on our planets.
Possibility 4: Species originate when new types of life stray into our planet after spacetime wormholes open up leading from some other dimension to our planet.
Possibility 5: Species originate because some divine creator or angel causes them to appear.
Possibility 6: We are living in a computer simulation created by extraterrestrials, and all fossils found are simply details added by them as kind of "backstory details" to flesh out the simulation.

Since we don't know which of these is true, we cannot appeal to the fact that some feature exists in multiple life forms as something that helps to substantiate any of these claims; because such a thing might happen under any one of these scenarios. In the case of gliding, we

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

have no known cases of gliding that have been proven to have been produced by natural selection and random mutations. So the mere fact that gliding has appeared in multiple species does nothing to support the claim that gliding could have easily appeared by natural selection and random mutations.

There are, in fact, very strong reasons for believing that a feature such as gliding could not have appeared through natural selection and random mutations. Let us consider the nature of gliding. Gliding between trees or branches requires an incredibly precise coordination between muscles, bones, web-like structures between limbs, eyes, and brain – for animals must not only land on a distant tree branch, but also be able to land on the branch without falling. If that coordination isn't just right, it will be very harmful or suicidal for an animal to try to glide between trees; for the animal will fall to the ground. Developing gliding is similar to developing a suspension bridge, in the sense that until the functionality is almost completed, what you have is functionality that will be suicidal if you try to use it. The table below illustrates the point.

	Gliding	**Suspension Bridge**
25% Completion	Suicidal (jumping causes animal to fall to death)	Suicidal (car using bridge ends up in river)
50% Completion	Suicidal (jumping causes animal to fall to death)	Suicidal (car using bridge ends up in river)
75% Completion	Suicidal (jumping causes animal to fall to death)	Suicidal (car using bridge ends up in river)
100% Completion	Marginally beneficial, or maybe not – still great risks in gliding, and sparse benefits	Beneficial (car is able to cross bridge)

So it seems that the appearance of gliding cannot be explained using Darwinian ideas. We have no explanation of how a species would have evolved the first 10% or the first 20% of gliding functionality, which would have had no “survival of the fittest” benefit. It's the same type of problem involved in trying to explain the evolution of flying without imagining gliding, which gives us problems such as the fact that there would be no survival benefit if just a wing stump ever appeared.

Then there's also the fact that if one imagines gliding animals turning into flying animals, you have no explanation of how all the changes occurred needed to change from gliding animals to flying animals. Trying to explain how Darwinian evolution could have produced “the

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

development of gliding" plus also "the evolution from gliding to flying" is not easier than trying to explain how Darwinian evolution could have produced only the evolution of flying.

For the reasons giving above, trying to make the evolution of birds seem easy by suggesting that nature first evolved gliding animals and then evolved birds from such animals is like reasoning that it's not very hard to climb to the top of the Met Life skyscraper in midtown Manhattan using outer wall climbing, because you can first climb the outer walls of the Chrysler building and then jump to the top of the nearby Met Life skyscraper. Alternate theories discussed by Dawkins to account for the origin of flight are not any more credible, and we can chuckle at his suggestion that perhaps feathers were first developed to catch insects. Dawkins has no clear story to tell us, saying that "perhaps birds began flying by leaping off the ground, while bats began by gliding out of trees" while adding that alternately "perhaps birds too began by gliding out of trees" (page 126). Such uncertainty does not amount to a convincing story of how flight appeared in birds.

In Chapter 8 Dawkins begins trying to explain how vision could have evolved through random mutations and natural selection. He uses the "smoke and mirrors" trick followed by similar reasoners, by focusing on the eye and acting as if we merely need to explain the appearance of eyes to explain the appearance of vision. Proceeding in such a way is very fallacious, because the eye is merely one part of a complicated system needed to explain vision, what we may call the vision system. The main elements of the vision system are:

1. The eye, which in modern organisms is an intricate arrangement of parts
2. Extremely complicated proteins and biochemistry used by the eye to capture light
3. The optic nerve connecting the eye to the brain
4. Extremely complicated changes in the brain needed for an organism to make use of inputs from the eye.

These parts are so complicated that even the most primitive vision system providing a minimal benefit will require an extremely complicated invention exceedingly unlikely to appear by chance, as unlikely as falling trees forming into a nice roofed log cabin. You cannot explain such an invention merely by describing how a primitive eye could appear.

To try to explain how a primitive eye could appear, Dawkins appeals to a scientific paper published by Nilsson and Pelger, and Dawkins inaccurately describes this as a "computer model." The paper does not actually describe any computer model or computer simulation. The paper describes how a circular patch of light-sensitive cells could change into a curved cupped eye, conveniently assuming that it underwent exactly the changes that would bring about such a thing (which would be most unlikely to occur given the thousands of possible ways that random mutations might change the appearance of

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

such a flat circular patch). The paper cheats by assuming that such a flat circular patch of light-sensitive cells would come to exist before it had any usefulness. The paper also includes absurd statements such as "The evolution of an eye can thus be compared to the lengthening of a structure, say a finger, from a modest 8 cm to 8000 km, of a fifth of the Earth's circumference." That is wrong because the evolution of an eye would be the assembly of a very intricate arrangement of coordinated parts, something vastly more complicated than just a mere lengthening of an object.

I can describe the type of smoke-and-mirrors trick involved in Nilsson and Pelger's paper. It works like this: given some complex functional arrangement of parts that is incredibly hard to achieve by chance, you try to make it look easy by ignoring 45% of the arrangement, and also assuming that another 45% of the arrangement was conveniently there to begin with; and then you argue that it's easy to make the arrangement because it's not too hard to make the remaining 10%. So, for example, someone might argue that it's pretty easy to make a suspension bridge, by ignoring the whole superstructure (the towers and the steel cables), and just assuming that the huge complicated substructure (leading down into the river) just happens to conveniently exist, and then kind of talking as if making a suspension bridge is as easy as building a road.

This is very close to what Nilsson and Pilger have done. They've simply ignored the requirements of an optic nerve and the incredibly complicated brain changes needed for vision, and they've assumed that the light-sensitive cells (so hard to achieve because they require fantastically improbable and intricate light-capturing proteins) were just there to begin with. Having either ignored or assumed the prior existence of 90% of a vision system, they then argue that the remaining part is easy, so it's easy for animals to get vision. This is a huge fallacy which Dawkins repeats, because he's so very eager to believe that vision is an easy hurdle for evolution to jump over.

Ignoring the almost unfathomable intricacy of a vision system, Dawkins seems to think that explaining eyes is as easy as explaining how some cells might simply form into a cup-shaped curve. Similarly, a person might fallaciously claim that it's real easy to make a camera, because all you need is a little box shape – or that it's easy to make a moon rocket, because all you need is a big tube shape.

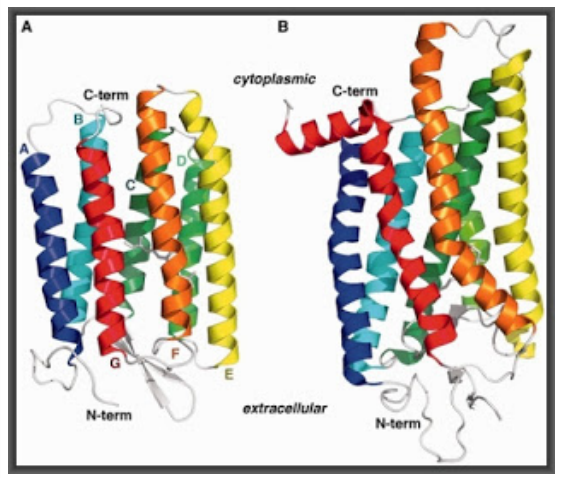
Here is a description of the insanely complicated light-capturing biochemistry going on in the eye, from a biochemistry textbook:

1. *Light-absorption converts 11-*cis *retinal to all-*trans*-retinal, activating rhodopsin.*
2. *Activated rhodopsin catalyzes replacement of GDP by GTP on transducin (T), which then disassociates into T_a-GTP and T_{by}.*
3. *T_a-GTP activates cGMP phosphodiesterase (PDE) by binding and removing its inhibitory subunit (I).*

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

4. *Active PDE reduces [cGMP] to below the level needed to keep cation channels open.*
5. *Cation channels close, preventing influx of Na^+ and $Ca2^+$; membrane is hyperpolarized. This signal passes to the brain.*
6. *Continued efflux of Ca^{2+} through the Na^+-$Ca2^+$ exchanger reduces cytosolic [Ca^{2+}].*
7. *Reduction of [CA^{2+}] activates guanylyl cyclase (CG) and inhibits PDE; [cGMP] rises toward "dark" level, reopening cation channels and returning V_m to prestimulus level.*
8. *Rhodopsin kinase (RK) phosphorylates "bleached" rhodopsin; low [Ca^{2+}] and recoverin (Recov) stimulate this reaction. Arrestin (Arr) binds phosphorylated carboxyl terminus, reactivating rhodopsin.*
9. *Slowly, arrestin dissociates, rhodopsin is dephosphorylated, and all-*trans*-retinal is replaced with 11-cis-retinal. Rhodopsin is ready for another phototransduction cycle.*

We have no mention of any of these complexities in Dawkins' book, which show the absurdity of his claims that it's easy to get an eye. The text above mentions proteins that are far more structurally complicated than a primitive eye, such as a rhodopsin protein specified in a gene that uses 1000+ base pairs to specify the protein.



Rhodopsin proteins used in vision

With a vision system we have the same type of "uselessness of a wing stump" problem in explaining the origin of flight. Aquatic animals are believed to be the first that had eyes. But imagine an aquatic animal with only the poorest type of vision, the type of vision you have if you cover your eyes with 2-ply toilet paper. With such vision the aquatic animal couldn't tell if other aquatic animals are far away, but it could only tell if they are very close (seeing just a very blurry blob ahead of itself). But a blind aquatic animal could already tell when another aquatic animal is very close, from its splash (and in a sea of blind fish, if you're a blind fish you will have other fish frequently bumping into you). So if a blind aquatic animal in a sea of blind aquatic animals gets the weakest type of vision, some extremely blurry vision, it doesn't produce a benefit. Very weak vision might also allow an

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

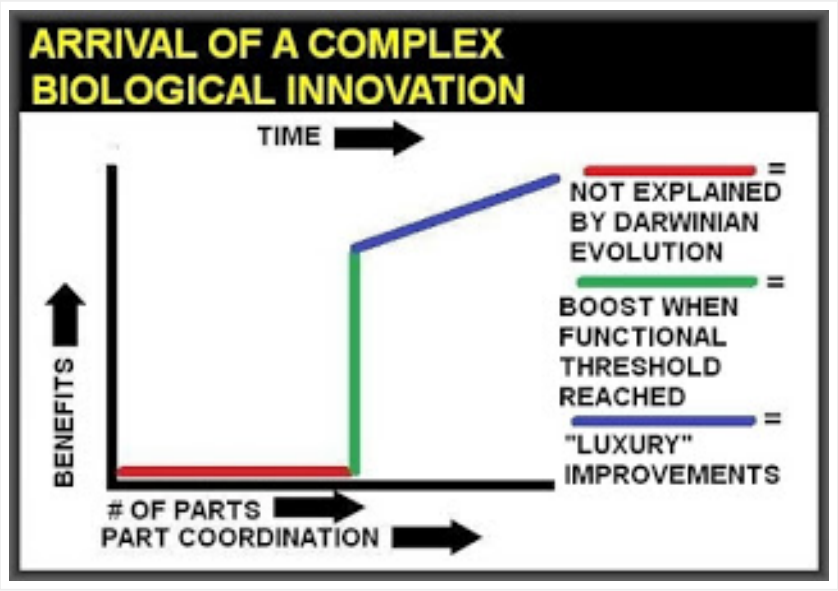
aquatic animal to know which way was up in the water. But a blind aquatic animal could already tell that from temperature changes in water and pressure changes (the deeper you go, the colder it is and the greater the pressure). And an aquatic animal doesn't need to know which way is up in the water.

So the poorest type of vision would have no survival value for an aquatic animal. If there were to be some incredibly improbable set of random mutations allowing the poorest type of vision, that would not be rewarded. For an aquatic animal, there is no series of gradual changes, each rewarded, that leads to the advanced functionality of vision. There is instead a high functionality threshold that must be reached before any survival reward is obtained, involving a complex, highly coordinated arrangement of parts needed to get something better than the weakest type of vision. We cannot explain how such a high threshold could be reached through random mutations and natural selection. For the threshold to be reached, too many complex parts have to be assembled with too much coordination. Far from being an "easy back route," this is a high cliff like the front face of Half Dome in Yosemite.

Natural selection is merely a dumb filter, something that can filter out bad designs but cannot explain the appearance of good designs. There is a very general reason why random mutations plus natural selection (a survival reward for greater fitness) cannot explain the origin of complex biological functionality. The reason is that the early stages of bringing into place such functionality would in general not yield rewards. Fragmentary implementations yield only very poor rewards or no rewards at all, and it is usually true that no reward is produced until a large fraction of an implementation is produced. So in almost all cases it is not possible to describe a pathway by which a series of random gradual changes could yield very complex functionality, with the early parts of the pathway producing a significant reward. If there is no reward in the early parts of the implementation pathway, it is gigantically improbable that nature would walk down that pathway, which would be only one of quadrillions of possible random paths.

The diagram below illustrates this point. The part in red represents the initial stages of a biological innovation, stages that are pre-functional and therefore not explained by an appeal to natural selection, which can only come into play once a functional threshold has been reached.

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)



Dawkins tells us that eyes independently evolved 44 times, and scientists say that random mutations would have to occur 100 times for a particular biological innovation to become fixed in the gene pool. This means our orthodox Darwinist is required to believe that 4400 times blind chance produced a vision system, which is rather like believing that 4400 full water-tight log cabins have been produced by random falling trees in forests (although the latter is far more likely). Given the intricacy of a vision system, vastly greater than a log cabin, we would not expect a vision system to have arisen by chance mutations and natural selection even once in the history of our galaxy. So when Dawkins tells us that an eye can appear on the evolutionary scene "at the drop of a hat," your fairy tale alarm should start ringing very loudly.

Considering all of its required parts (including very complex brain changes, fine-tuned proteins, an optic nerve, and intricate eye anatomy), a vision system is one of the most complex cases of organized functionality known to man. Adherents of the Darwinian "modern synthesis" have no way to account for this, for they lack any theory of organization. Darwinism is a theory of *accumulation*, not a theory of organization – the accumulation of random changes by mutations. As an evolutionary biologist confessed recently, "Indeed, the MS [modern synthesis] theory lacks a theory of organization that can account for the characteristic features of phenotypic evolution, such as novelty, modularity, homology, homoplasy or the origin of lineage-defining body plans." But what do some people do when they have to explain mountainous levels of organization, and they lack a biological theory of organization? They try to fake their way through, by using verbal tricks, carefully selective prose and omissions to try to make the mountain of organization look like a mere molehill of organization.

We may compare Darwinian evolution to a man trying to build elaborate structures, but who is acting under two handicaps. The first is that he has a refrigerator-sized steel block chained to his leg. The block (causing such slowness) symbolizes the fact that Darwinian evolution relies on favorable random mutations to achieve innovations, but such mutations should be so rare that waiting for

them means the Darwinian evolution of complex macroscopic innovations should work no faster than a snail's pace. We may also imagine that this man has been commanded to operate under a rule of "do 100 harmful things for every useful thing you do." Such a rule symbolizes the fact that for every random mutation that is helpful, there are very many that are harmful. How fast should such a man be able to build useful structures? Never faster than an insanely slow pace. So if the fossil record shows something like the Cambrian Explosion, in which every major phylum of animal now existing appeared in a relatively short time, we must suspect something was going on much more than just Darwinian evolution by random mutations and natural selection.

Any convincing naturalistic attempt to explain the origin of vision and the origin of other complex biological functionality would devote a great deal of time to explaining the exceptionally fine-tuned and intricate biochemistry of life, and would also devote a great deal of time to explaining how it is that so many fine-tuned proteins came to arise in human biology. For countless proteins there is what is called a steep fitness landscape. This means that the proteins can only function well if they have a small number of states very similar to their existing states. Explaining the origin of such proteins is a nightmare for thinkers such as Dawkins who maintain that nothing but blind chance and natural selection brought these proteins into existence. Calculations repeatedly indicate that it would take something like ten to the seventieth power tries or search attempts for nature to find a particular type of protein known to exist; and there are thousands of such proteins in the human body. The number of search attempts that nature would have time to accomplish in the history of the earth is some number trillions of times smaller.

Does Dawkins book have some chapters trying to explain the origin of fine-tuned proteins? To the contrary, there isn't even an entry for proteins in the index of his book, nor is there an entry for chemistry or biochemistry. We would also expect that any convincing naturalistic attempt to explain the origin of vision and the origin of other complex biological functionality would devote a great deal of time to topics such as coordination and coherence, since the marvel of biological functionality is largely the wonder of how lots of small parts can work together in such a coordinated and coherent way. But we find no entry for "coordination" or "coherence" in Dawkins' index, which also doesn't have an entry for "complexity."

Dawkins book fails completely in its attempts to show "easy back routes" by which Darwinian evolution could produce great wonders of complexity. He fails to provide a single example of some impressive piece of macroscopic biological functionality that has been proven to have been produced by natural selection and random mutations. No such example exists. Dawkins also fails to provide a single plausible story leading us to think that natural selection and random mutations would have been capable of producing any impressive piece of very complex macroscopic biological functionality.

In this regard Dawkins is in good company. The passage on vision biochemistry that I quoted is from page 459 of the 1119-page biochemistry textbook *Lehninger Principles of Biochemistry*. The book gives us a thousand pages of description of the most intricate machine-like biochemistry in the human body, but does basically nothing to explain how this functionality could have originated (apart from a short pro-forma review of Darwinism tenets, which don't specifically deal with biochemistry). There is endless discussion of proteins, but when I look up "proteins, evolution of" in the index of the book, I am referred to 5 pages that make no substantive clarification as to how fine-tuned proteins could have naturally evolved. How did we get all these thousands of fine-tuned proteins, each so fantastically unlikely to have arisen by chance? Our 1119-page biochemistry textbook has no real answer. Similarly, the 1041-page textbook *Biochemisty* by Lubert Stryer of Stanford University is notable for making no substantive attempt to explain the origin of any part of the wonderful biochemical machinery it discusses. The index of the book lists only 20 pages referring to evolution, and when I look up those pages I find only passing or incidental references to evolution. Mentioning Darwin in only one paragraph, with only a passing mention, the 1041-page book lacks even a substantial exposition of Darwinian theory, and doesn't even mention natural selection in its index, ignoring the topic of the origin of life and the origin of proteins. Which is not what we would expect if Darwinian theory were useful in explaining the origin of life or very complex biochemistry machinery.

Nor is there any real origins answer offered by this long recent review of the topic of protein evolution, which states this near its end (referring to protein folds):

It is not clear how natural selection can operate in the origin of folds or active site architecture. It is equally unclear how either micromutations or macromutations could repeatedly and reliably lead to large evolutionary transitions. What remains is a deep, tantalizing, perhaps immovable mystery.

Posted by Mark Mahin at 9:45 AM No comments:

Labels: Darwinism, evolution, natural selection, origin of biological complexity, requirements underestimation

Thursday, June 29, 2017

Why Did They Call These Tiny-Brain Hominids "Almost Human"?

A recent book on paleontology is the book *Almost Human: The Astonishing Tale of Homo naledi and the Discovery That Changed Our Human Story*. The book is by two paleontologists named Lee Berger and John Hawks. They and their colleagues found some fossils of a species called *Homo naledi*.

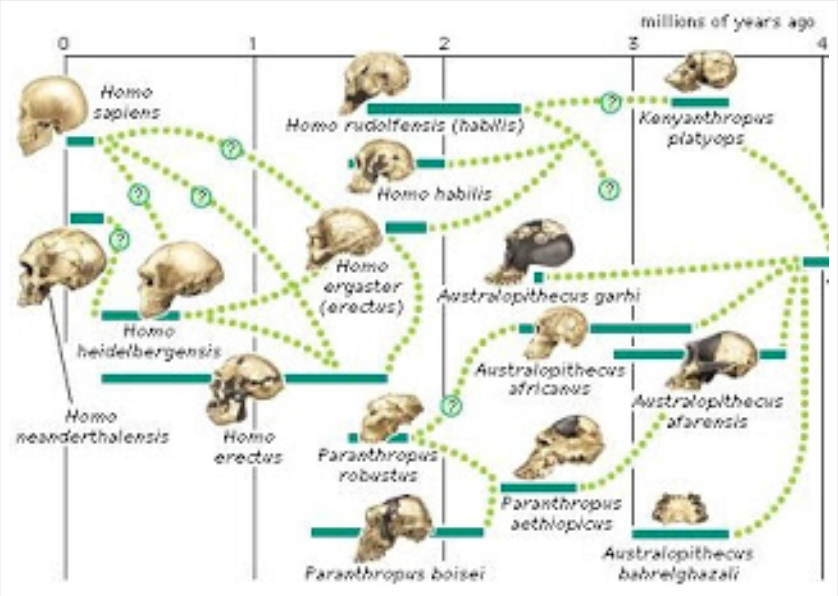
So how does that fit into some scheme of human origins? On page 42 of the book, the authors have a diagram entitled, "A

Depiction of the Family Tree of Hominin Species." It's a quite wobbly-looking diagram, not something that should cause anyone to think that our scientists have human origins figured out very well. This is because the diagram is one of those "tree of ancestry" types of diagrams, but four of the nodes in the diagram are question marks.

The diagram makes these claims:

- From Unknown Ancestor 1 there descended *Paranthropus boisei, Paranthropus robustus, Austrolopithecus africanus*, *Austrolopithecus afarensis,* and Unknown Ancestor 2.
- From Unknown Ancestor 2 there descended *Homo rudolfensis, Australopithecus sediba, Homo habilis*, and Unknown Ancestor 3.
- From Unknown Ancestor 3 there descended *Homo erectus, Homo floresiensis, Homo naledi*, and Unknown Ancestor 4.
- From Unknown Ancestor 4 there descended modern humans, Neanderthals, and archaic African humans.

So according to the diagram, there is not just one missing link, but four missing links. When you look at the diagram, it seems to have quite a bit of arbitrary guesswork. If you do a Google image search for "Hominin family tree," you will see other diagrams, some of which give a different story. The ancestry tree in an article at Britannica.com has even more question marks, having a total of 7 question marks, indicating seven missing links.



Credit: Britannica.com

The diagram in the *Almost Human* book puts *Homo floresiensis* in the left top of the "tree of ancestry," claiming *Homo floresiensis* was close to being an offshoot of *Homo erectus*. A recent study rejects this positioning, claiming that *Homo*

floresiensis has a completely different ancestry, and was an offshoot not of *Homo erectus* but *Homo habilis*. Given such a confusing hominid fossil record, with a large variety of different skulls found at different places around the world, it is no wonder that paleontologists often disagree with each other in drawing a tree of human ancestry.

Part of the uncertainty is because our paleontologists do not have what they would like to have. This is one of the dirty little secrets of modern evolutionary biology. Our evolutionary biologists do not have the DNA evidence they need to solidify the claims they make about human origins. The problem is that regular organic material rots in less than a few thousand years, and you can't get much DNA from a very old fossil bone. It has been estimated that the half-life of DNA is only about 500 years. So we don't have any adequate DNA evidence from *Homo erectus* or *Homo habilis*, which are claimed to be ancestors or evolutionary cousins of the human species. The oldest DNA from a claimed human ancestor is a scrap of DNA dating back 400,000 years. But this is only about 16,000 base pairs, and the human genome is 3.2 billion base pairs. Such a tiny scrap doesn't give you a hundredth of what you would need to genetically verify that such an organism was an ancestor of humans.

Imagine a trial in which the prosecution claimed that blood photographed at a crime scene is the blood of the person being tried. But imagine the blood was washed away by a thunderstorm before its DNA was checked, so no DNA match was made. That's the kind of position our evolutionary biologist is in. He really needs some complete *Homo erectus* DNA or *Homo habilis DNA* to back up his claims that these are human ancestors or human evolutionary cousins. But no such DNA exists, merely a rare scrap here and there.

We do have the complete DNA of modern humans and modern chimpanzees, and some argue that the similarity between these two implies that both had a common evolutionary ancestor. It is claimed that the protein-coding part of the human genome is 96% similar to the protein-coding part of the chimpanzee genome. But this refers to merely the building materials of proteins (amino acids), and is not based on a comparison of the full proteins, each of which has a 3D shape. No one knows for sure how proteins get their 3D shapes. This is the long-standing protein folding problem discussed here. When you look at the full proteins including their shapes, not just the amino acid building blocks specified in DNA, it turns out that chimpanzees and humans are not so similar. The scientific paper here is entitled "Eighty percent of proteins are different between humans and chimpanzees."

Does the fact that hominid fossils can be arranged into a "tree of ancestry" diagram prove that they have an evolutionary relationship? Not really. Given any large random data set, and a person determined to show some "tree of ancestry," it is usually possible for a "tree of ancestry" to be created. For example, if I

go into the Yankee Stadium parking lot, and diligently start looking for cars that look like descendants of each other, I would be able to cherry-pick some cars and arrange them into a "tree of ancestry" showing what might look like a plausible evolutionary progression from one car model to another. But such a diagram (looking rather like the one below) would probably not be historically correct.

But what about the fossils that Berger and Hawks found, the *Homo naledi* fossils? Are they, in fact, fossils of some species that was "almost human," as the book title states? Not by a long shot. On page 193 of their book, the scientists finally give us an estimate of the brain size for the *Homo naledi* organisms corresponding to the fossils they found. It was about 560 cubic centimeters for a male, and about 450 cubic centimeters for a female. The average size of a male human brain is about 1350 cubic centimeters.

So far from being "almost human," *Homo naledi* had a brain only about 41% of the size of the modern human brain. Which means that *Homo naledi* was apparently well short of being even half-human. So given that our paleontologists have written a book with the title *Almost Human: The Astonishing Tale of Homo naledi and the Discovery That Changed Our Human Story,* we must ask: why did they choose to call their book "Almost Human"? Is it because such a title would sell more copies than an accurate title such as "Not Even Half Human"?

Posted by Mark Mahin at 10:14 AM 1 comment:

Labels: evolution, origin of man

Sunday, May 28, 2017

The Doctor Carved Up Their Explanatory Pretensions

When I go to the public library and select a book dealing with human origins, I often feel rather like someone in a *Star Trek* episode who might be transported inside one of those cubic

spaceships of the Borg Collective, and who then might seek out a fresh, individualistic opinion from one of the inhabitants. It sometimes seems that the community of evolutionary biology professors is some kind of Borg Collective or hive mind, enforcing the same rubber-stamp thinking with robotic efficiency, with the same lack of individualism as a division of North Korean soldiers. So if you pick up a book on biological origins, you will expect that with high probability you will get the same old "just so stories," the same old requirements underestimations, the same old exaggerations of the significance of peripheral or borderline evidence, the same old worshipful kneeling to Darwinian authority, the same old claims that the not-at-all-creative principle of natural selection is a magic wand that explains practically all of the wonders of biological innovation.

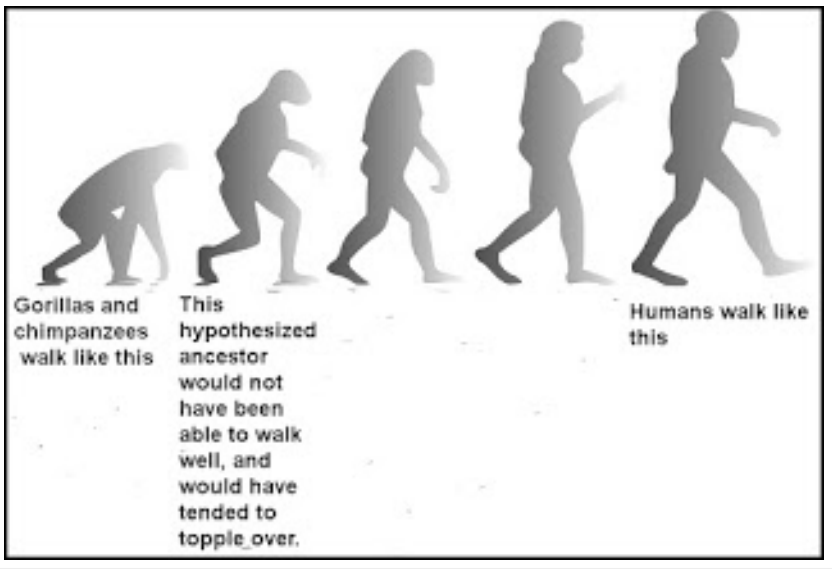
I was therefore quite surprised to find on my public library bookshelf the book *Why Us? How Science Rediscovered the Mystery of Ourselves* by physician James Le Fanu, who has written extensively in mainstream media and journals such as the British Medical Journal and the Journal of the Royal Society of Medicine. Although he shows no religious motive, Le Fanu is very much a skeptic about the explanatory value of Darwinism. Le Fanu does not seem to doubt that life on Earth is very old, and he seems to favor the idea that humans have somehow evolved from other species. But he rejects the claim that Darwin's idea of natural selection can explain the origin of mankind or the more impressive cases of biological complexity.

On page 39 Le Fanu states, "The more one reflects on what is involved in standing upright or acquiring a large brain, the less convincing Darwin's proposed mechanism of natural selection appears to be." He calls the reader's attention to the problem that while knuckle-walking like a gorilla (with four limbs) works well, and walking like a man works well, if there were to be evolution from four-limb walking to bipedal walking, it would require passing though an intermediate stage that wouldn't work well at all, with organisms being prone to topple over when they walked (and be devoured by predators). So the progression over many thousands or millions of years would be:

4-limb walking (works well) → Intermediate stage (works poorly) → Bipedal walking (works well)

The problem is that this progression is unbelievable under a theory of natural selection, which should stop any progression that works against survival value. The issue with the brain pointed out by Le Fanu is that to a creature in the wild, a much larger brain doesn't have much value, and has a negative value of making the birth delivery of a child much harder and more dangerous, due to the difficulty of passing a large brain though the narrow birth canal. Le Fanu states acidly on page 57, "It has taken just a few pages to draw out the contradictions, at every

turn, in the prevailing scientific certainty of 'natural selection' as the driving force of the Ascent of Man."



On pages 92-95 Le Fanu discusses the evolution of the eye, eventually concluding on page 95 that "there is not a single empirical discovery in the past 150 years that has substantiated Darwin's proposal that natural selection, 'taking advantage of slight successive variations,' explains the 'puzzle of perfection' epitomised by so many different types of eye – which remain yet more puzzling than it was in 1859." He would have made this point more powerfully if he had also pointed out the incredibly elaborate proteins and brain changes involved in vision.

Another doctor (Joseph A. Kuhn) does just such a thing in a scientific paper, noting the inadequacy of Darwinian explanations for the eye. He states:

However, biochemists have shown that even a simple light-sensitive spot requires a complex array of enzyme systems. When light strikes the retina, a photon interacts with a molecule called 11-cis-retinal, which rearranges within picoseconds to trans-retinal. The change in the shape of the retinal molecule forces a change in the shape of the protein rhodopsin. The protein then changes to metarhodopsin II and sticks to another protein, called transducin. This process requires energy in the form of GTP, which binds to transducin. GTP-transducin-metarhodopsin II then binds to a protein called phosphodiesterase, located on the cell wall. This affects the cGMP levels within the cell, leading to a signal that then goes to the brain. The recognition of this signal in the brain and subsequent interpretation involve numerous other proteins and enzymes and biochemical reactions within the brain cells. Thus, each of these enzymes and proteins must exist for the system to work properly...In summary, the eye is incredibly complex. Since it is unreasonable to expect self-formation of the enzymes in perfect proportion simultaneously, eye function represents a system that could not have arisen by gradual mutations.

After mentioning whale evolution, where the fossils seem to show dramatic evolution of structure moving way too fast to be accounted for by random mutations, Le Fanu states on page 120, “By 1980 the logical implications of such biological 'insolubilia' seemed inescapable: the central premise of Darwin's evolutionary theory of gradualist transformation was no longer tenable....Some other dramatic mechanism, as yet unknown to science, must account for the extraordinary diversity of life as revealed by the fossil record.”

On page 229 Le Fanu scolds scientists for their overconfident knowledge pretensions, and accuses them of “persuading us that we know so much more than we really do, or can.” On page 231 he states that the “proposed mechanism of natural selection as the 'cause' of the diversity of living things is contradicted at every turn by the empirical evidence of science itself.” Speaking of Darwinism on page 255, he says “As time has passed its anomalies and inconsistencies have proved ever more pressing, and now, with the crushing verdict of the genome projects, we are left to stare into the abyss of our ignorance of virtually every aspect of the complexities of the living world and its evolutionary history.”

Defenders of Darwinian orthodoxy are constantly trying to make it look as if everyone accepts Darwinism but the religiously motivated. A book like Le Fanu's helps to show otherwise, for he seems to have no religious motivation at all. While many claim that we must choose between Darwinism on one hand and creationism or intelligent design on the other hand, Le Fanu's book reminds us there is another major alternative: the simple alternative of saying, “We don't know the answer to this mystery.” You may refer to this position as origins agnosticism.

Why does someone like Le Fanu differ so strongly from the professors of evolutionary biology? Is it because he knows less about biology than such persons? Not at all; doctors know just as much about biology as biology professors, and probably more. I think the difference is that when you train to be a doctor, you do not undergo the years of social conditioning that our evolutionary biology professors are subjected to, in which they are placed in club-like “high peer pressure” social environments in which adherence to Darwinian dogma is constantly demanded. You can get to be a doctor without becoming a thought-robot of the hive mind or Borg Collective that is the community of evolutionary biology professors. Surveys indicate that skepticism about Darwinian orthodoxy is much higher among physicians than among professors, and the author of this scientific paper is another doctor doubtful about Darwinism.

A superb writer, Le Fanu is a critic of great insight, and his book is very thought-provoking. On page 108 of his book, he makes a comment that the modern scientist should print out and tape to his office wall: “The greatest obstacle to scientific progress, after all, is not ignorance, but the illusion of knowledge.” True indeed – our scientific progress may be accelerated when overconfident scientists stop pretending to understand mysteries that they do not really understand, mysteries that may take mankind a thousand years to solve.

Postscript: There's an interesting new book called *Cracking the Aging Code* by theoretical biologist Josh Mittledorf PhD and Dorion Sagan. The book is mainly on theories of aging. But on page 31 Mittledorf writes this:

I found that neo-Darwinism doesn't work very well as a description of real life. Several big things about life in general just don't add up in the context of neo-Darwinism: There's aging and death -- I'll try to show you in the coming chapters why I don't think you can account for the basic facts about aging within the framework of neo-Darwinism. But in addition, neo-Darwinism can't account for sexual reproduction or for the structure of the genome that seems actually "designed" to make evolution possible; neo-Darwinism also does not have a place for the recently established phenomena of epigenetic inheritance or horizontal gene transfer.

On page 84 the authors state this: "Natural selection cannot be observed in the wild, because it requires huge areas and thousands of years." On the same page the authors state this: "But evolutionary biology today is a uniquely sick science, missing the vibrancy, the audacity, and the commitment to empirical truth that form the core of the scientific method."

Posted by Mark Mahin at 9:49 AM No comments:

Labels: Darwinism, evolution, natural selection, origin of man, recommended books

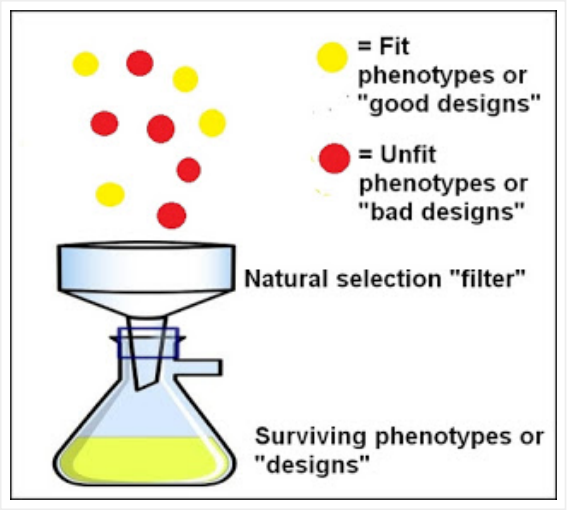
Tuesday, February 21, 2017

Dennett's Book Dodges the Real Problems in Explaining Minds

Philosopher Daniel C. Dennett has long been regarded as one of the top apologists of materialism, so no doubt his fans must have had high hopes for his new tome, entitled *From Bacteria to Bach and Back: The Evolution of Minds*. But the book fails to give us anything like a coherent plausible explanation for the origin of human mentality.

The first part of the book consists largely of Dennett pontificating about natural selection, which Dennett inaccurately portrays as some great creative force. What we

have are the typical exaggerations and misstatements of Darwin fanboys on this topic, and they are delivered most dogmatically, with very little supporting evidence. Dennett provides no examples of innovative complex macroscopic features of organisms that have been proven to have originated by natural selection and random mutations – because no such proof has been produced by scientists. Contrary to Dennett's assertions, natural selection is merely a kind of pruning effect or filter that gets rid of bad designs, not something that has any power to produce complex good designs. Natural selection may describe survival of the fittest, but does not explain the arrival of the fittest.



The diagram above tells the true nature of natural selection. It is not something that explains the appearance of the yellow circles in the diagram, but merely explains how the red circles got filtered out.

On page 43, Dennett claims that natural selection is a collection of algorithms, and on page 384 he claims that "natural selection is a substrate-neutral family of algorithms." These claims are false. An algorithm is a sequential set of steps to follow to achieve a particular result, being something that is processed by either a mind or a computer. Natural selection is simply the observational fact of survival of the fittest, the fact that fit things survive longer and reproduce more than unfit things. Natural selection is neither an algorithm nor a collection of algorithms.

The great question about natural selection is: how could this mere pruning effect (which is merely a filter) ever explain the astonishingly complex and coordinated biological complexity we see in the real world? Dennett doesn't explain this in any substantive way, although he very clumsily provides a visual to try to warm us up to the idea that something apparently designed can be produced naturally. He gives us a *Science* magazine photo showing some circles of stones, and discusses a geological theory that supposedly naturally explains these circles as natural geological effects. The problem with that, of course, is that the complexity we see in biological systems is

trillions of times more complex (and gigantically more coordinated) than some little circles of stones.

Later on Dennett has a chapter with the rather silly title "Brains Made of Brains." On page 155 he advances the frequently stated misconception that the brain is massively parallel. Getting things all mixed up, he states, "Brains are parallel (they execute many millions of 'computations' simultaneously, spread over the whole fabric of the brain); computers are serial (they execute one single simple command after another, a serial single-file stream of computations that makes up for its narrowness by its blinding speed)." To the contrary, human brains do not do many computations simultaneously, and humans can do only one math computation at a time; conversely you can buy desktop computers that actually do dual-processing which is parallel processing.

Sounding like a real Richard Dawkins fanboy, Dennett goes on to a long enthusiastic discussion of Dawkins' idea of memes. But such a discussion is not something that helps at the job of explaining the appearance of human minds. Memes are ideas, and do nothing to explain how we have a mind that produces ideas.

Dennett seems to dodge or largely ignore the main difficulties of explaining the origin of minds such as ours. One of the principal difficulties is the fact that according to the prevailing account, in a period of a few million years hominid ancestors evolved into large-brained humans; but the population of these hominids was supposedly very small when this happened, being no greater than 20,000 or so. The problem is that such a progression would have required many beneficial mutations, and the number of mutations in a population is proportional to the size of the population; so beneficial random mutations in a small population should be incredibly rare. As discussed in this scientific paper, calculations based on known mutation rates suggest that a few million years is way, way too small a time to allow for so many favorable mutations in such a small population, which we should not have expected to see in even 500 million years of time. This "waiting time" problem is one of the chief difficulties of explaining the origin of human minds. But Dennett simply ignores it.

Another set of difficulties lies in the fact that our minds have quite a few characteristics that we cannot plausibly explain by appealing to natural selection. As was pointed out at length in this essay by the co-founder of the theory of natural selection (Alfred Russel Wallace), the human mind has many capabilities and abilities that seem to be impossible to explain by means of natural selection, because they are things that do not improve an organism's chance of surviving in the wild. Among these things are aesthetic abilities, insight, curiosity, philosophical abilities, language abilities, mathematical abilities, spirituality,

and altruism. As argued here, none of these things would make an organism significantly more likely to survive in the wild, so we cannot explain them by the idea of natural selection. So how did we get them? Dennett fails to provide an answer.

In my essay I referred to in the previous paragraph, I didn't even mention an additional problem: the difficulty of explaining man's very long-term memory. Humans have memories that can reliably recall things that happened 50 years ago, but this is very much a "luxury feature" exceeding by a factor of 25 what is necessary for survival. An organism would do just fine in the wild remembering things for only one or two years, by just remembering all of the skills and body/location memories it used in the last year or two. Besides being inexplicable from a Darwinian standpoint, our minds capable of storing memories for 50 years are inexplicable from a neurological standpoint. The leading theory of memory involves the idea that synapses store memories. But that doesn't work, because (as discussed here) synapses are subject to very rapid molecular turnover and structural turnover which should make them unsuitable for storing memories for longer than a year.

As far as I can see Dennett completely ignores the whole issue of explaining human memory, not even trying to explain it. He also seems to dodge or largely ignore the main philosophical issue involved in explaining human minds – the issue of how it could possibly be that a merely physical thing could produce the rich mental reality of our consciousness. Philosophers have long smelled an inherent implausibility that any merely physical thing (no matter how complicated its arrangement) could yield the very non-physical thing we call the human mind. For a physical brain to produce Mind seems rather like a stone pouring out blood when you squeeze it.

The only way Dennett seems to handle this issue is through a gigantic cop-out. His fourteenth chapter is entitled, "Consciousness as an Evolved User-Illusion." I won't describe his nonsensical reasoning, but will merely note that the moment a thinker starts claiming that consciousness is an illusion, he has revealed the intellectual bankruptcy and unreasonableness of his assumptions.

In the last four pages of his book, Dennett provides a grand summary of his explanation of our minds. The summary is an incoherent mess. It starts with the last of his numerous appeals to the authority of Darwin, the type of *Darwin showed nature is purposeless* talk that thinkers like Dennett give like some Freudian reverently stating *Freud showed our anxieties are caused by our childhood sex conflicts*. Then Dennett goes on to mention Alan Turing (who helped get computers started) and Shannon (who made contributions to information theory). This seems more like name-dropping than something that helps in explaining our minds. Computers have nothing to do with

explaining the origin of human minds. Giving a final salute to Dawkins, Dennett also mentions in italics "*words striving to reproduce*," which is a strange personification that does nothing to clarify the origin of our minds. Then in the book's second-to-last paragraph he reiterates his cop-out claim that consciousness is a "user-illusion."

Of course, by claiming that consciousness is just an illusion, a writer has a convenient excuse for failing to explain it, on kind of the grounds of "there's pretty much nothing there to explain." It's convenient Dennett has such an excuse, as his book sheds little light upon the origin of our minds.

Postscript: Today I am reading *Evolution and Ecology: The Pace of Life* by Cambridge University biology professor K. D. Bennett. Referring to speciation (the origin of species), this mainstream authority says on page 175, "Natural selection has been shown to have occurred (for example, among populations of Darwin's finches), but there is no evidence that it accumulates over longer periods of time to produce speciation in the Darwinian sense." So why have we been so often told the opposite by Darwin enthusiasts?

Posted by Mark Mahin at 10:52 AM No comments:

Labels: consciousness, evolution, mind, natural selection, origin of Mind, philosophy of mind

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Sunday, November 13, 2016

Epigenetics Cannot Fix the "Too-Slow Mutations" Problem

Recently in Aeon magazine there was an article entitled "Unified Theory of Evolution" by biologist Michael Skinner. The article starts out by pointing some problems in Neo-Darwinism, the idea that natural selection and random mutations explain changes in species or the origin of species. The article says this:

One problem with Darwin's theory is that, while species do evolve more adaptive traits (called phenotypes by biologists), the rate of random DNA sequence mutation turns out to be too slow to explain many of the changes observed...Genetic mutation rates for complex organisms such as humans are dramatically lower than the frequency of change for a host of traits, from adjustments in metabolism to resistance to disease. The rapid emergence of trait variety is difficult to explain just through classic genetics and neo-Darwinian theory.... And the problems with Darwin's theory extend out of evolutionary science into other areas of biology and biomedicine. For instance, if genetic inheritance determines our traits, then why do identical twins with the same genes generally have different types of diseases? And why do just a low percentage (often less than 1 per cent) of those with many specific diseases share a common genetic mutation? If the rate of mutation is random and steady, then why have many diseases increased more than 10-fold in frequency in only a couple decades? How is it that hundreds of environmental contaminants can alter disease onset, but not DNA sequences? In evolution and biomedicine, the rates of phenotypic trait divergence is far more rapid than the rate of genetic variation and mutation – but why?

As interesting as these examples are, they are merely the tip of the iceberg if you are talking about cases in which biological functionality arises or appears too quickly to be accounted for by assuming random mutations. The main case of such a thing is the Cambrian Explosion, where we see a sudden explosion of fossils in the fossil record about 550 million years ago, with a large fraction of the existing phyla suddenly appearing. Instead of seeing some slow gradual progression in which we very gradually see more complex things appearing over a span of hundreds of millions of years, we see in the fossil record many dramatic new types of animals suddenly appearing.

The other main case of functionality appearing too quickly to be accounted for by random mutations is the relatively sudden appearance of the human intellect. The human population about 1 million years

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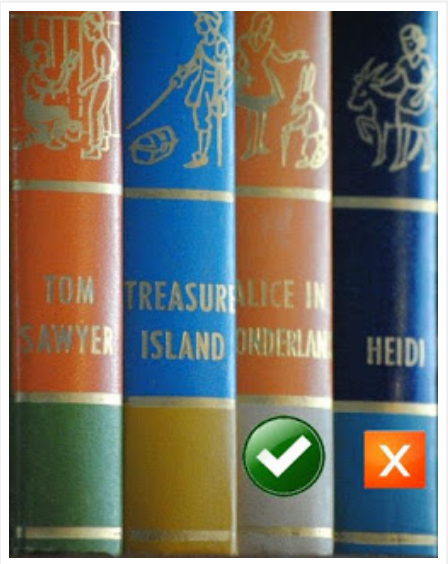
years ago was very small. This article tells us that 1.2 million years ago there were less than 30,000 in the population. The predicted number of mutations is inversely proportional to the population size, which means the smaller the population, the lower the number of mutations in the population. So when you have a very small population size, the predicted mutation rate is very low. But suddenly humanity about 100,000 or 200,000 years ago seems to have got some dramatic increase in brain power and intellectual functionality. Such a thing is hard to plausibly explain by mutations, given the very low number of mutations that should have occurred in such a small population.

But Skinner tries to suggest there is something that might help fix this "too-slow mutations" problem in Neo-Darwinism. The thing he suggests is epigenetics. But this suggestion is mainly misguided. Epigenetics cannot do the job, because it is merely a kind of "thumbs up or thumbs down" type of system relating to existing functionality, not something for originating new functionality.

Skinner defines epigenetics as "the molecular factors that regulate how DNA functions and what genes are turned on or off, independent of the DNA sequence itself." One of the things he mentions is DNA methylation, "in which molecular components called methyl groups (made of methane) attach to DNA, turning genes on or off, and regulating the level of gene expression." Gene expression means whether or not a particular gene is used in the body.

The problem, however, with epigenetics is that it does not consist of detailed instructions or even structural information. Epigenetics is basically just a bunch of "on/off" switches relating to information in DNA.

Here is an analogy. Imagine there is a shelf of library books at a public library. A librarian might use colored stickers to encourage readers to read some books, and avoid other books. So she might put a little "green check" sticker on the spines of some books, and a little "red X" sticker on the spines of other books. The "green check" sticker would recommend a particular book, while the "red X" sticker would recommend that you avoid it.



Perhaps such stickers would have a great effect on which books were taken out by library patrons. Such stickers are similar to what is going on with epigenetics. Just as the "red X" sticker would instruct a reader

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- 2019 (95)
- 2018 (93)
- 2017 (92)
- 2016 (92)
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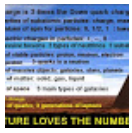
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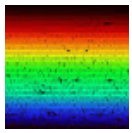
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to avoid a particular book, an epigenetic molecule or molecules may act like a flag telling the body not to use a particular gene.

But these little "green check" and "red X" markers would not explain any sudden burst of information that seemed to appear in too-short a time. For example, suppose there was a big earthquake at 10:00 AM, and then at 11:00 AM there appeared a book on the library shelf telling all about this earthquake, describing every detail of it and its effects. We could not at all explain this "information too fast" paradox by giving any type of explanation involving these little "green check" and "red X" stickers.

Similarly, epigenetics may explain why functionality that appeared too fast is or is not used by a species, but does nothing to explain how that functionality appeared too fast. Epigenetics is making some valuable and interesting additions to our biological knowledge, but it does nothing to solve the problem of biological information appearing way too quickly to be accounted for by assuming random mutations.

Another analogy we can use for epigenetics is what programmers call "commenting out code." Given some software system such as a smartphone app, it is often easy for a programmer to turn off particular features. You can do what programmers call "commenting out" to turn off particular parts of the software. So the following is a quite plausible conversation between a manager and a programmer:

Manager: Wow, the app looks much different now. Some of the buttons that used to be there are no longer there, and two of the tabs have disappeared. How did you do that so quickly?
Programmer: It was easy. I just "commented out" some of the code.

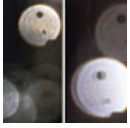
Such "commenting out" of features is similar to gene expression modification produced by epigenetics, in which there's a "let's not use this gene" type of thing going on. But the following is a conversation that would never happen.

Manager: Wow, the app looks much different now. I see there's now some buttons that lead you to new pages the app never had before, which do stuff that the app could never do before. How did you do that so fast?
Programmer: It was easy. I just "commented out" some of the code.

The programmer would be lying if he said this, because you cannot produce new functionality by commenting out code. Similarly, some new biological functionality cannot be explained merely by postulating some epigenetic switch that causes some existing gene not to be expressed. That's like commenting out code, which subtracts functionality rather than adding it.

I can give Skinner credit for raising some interesting questions, but he does little to answer them. The problem remains that biological information has appeared way too rapidly for us to plausibly explain it by random mutations.

For every case in which random mutations produce a beneficial effect, there are many cases in which they produce a harmful effect. Long experiments on exposing fruit flies to high levels of mutation-causing radiation have not produced any new species or viable structural benefits, but produce only harm. We have so far zero cases of species that have been proven to have arisen from random mutations, and we



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also have zero cases of major biological systems or appendages that have been proven to have arisen from random mutations. So why do our scientists keep telling us that 1001 wonderful biological innovations were produced by random mutations?

It's rather like this. Imagine Rob Jones and his family get wonderful surprise gifts on their doorstep every Christmas, left by an anonymous giver. Now suppose there is someone on their street named Mr. Random. Mr. Random behaves like this: (1) if you invite him into your home, he makes random keystrokes on whatever computer document you were writing; (2) if you eat at his house, he'll give you probably-harmful soup made from random stuff he got from random spots in his house and backyard, including his bathroom and garage; (3) if you knock on his door, and ask Mr. Random for a cup of sugar, he'll give you some random white substance, maybe sugar or maybe plaster powder or rat poison. Now imagine how silly it would be if Rob Jones were to look on those fine Christmas gifts on his doorstep, and say to himself: *Let me guess who left these – it must have been Mr. Random!*

Posted by Mark Mahin at 11:38 AM No comments:

Labels: Darwinism, evolution, mutations, randomness

Tuesday, November 1, 2016

What Is Increasing Human Intelligence?

The Flynn effect is a well-documented effect that involves a gradual increase in performance in intelligence tests. The increase seems to be about 3% per decade, and has seemingly been occurring since the 1930's. Some of the implications are startling -- for example, that before many decades have passed, the average person living will have an intelligence level of the average Harvard freshman today.

There have been various attempts to naturally explain the Flynn effect, but none have been very convincing. One attempted explanation has been that nutrition has been better in recent decades. But James Flynn has pointed out that there was a steady growth of IQ scores among Dutch people between 1952 and 1982, even though those taking the test around 1962 should have suffered from worsened nutrition as children during World War II (there was a Dutch famine in 1944). Also, there is little evidence that very many US children suffered from malnutrition between 1940 and 1970. So it's not like we can say, "Only in recent decades have American children started to eat properly."

People trying to account for the Flynn effect usually consider only the period from 1930 onward. But the apparent increase in human intelligence since 1930 may be only one facet of a larger mystery of unaccountable increases in human intelligence, a mystery that may stretch back many thousands of years.

Consider the blossoming of human intelligence that occurred long ago. Rather suddenly, humans started to grow crops, and not too long after that, humans started to create cities. Before long we had things such as the glories of Greek sculpture, the philosophy of Plato, the mathematical works of Euclid, and the architectural and organizational achievements of the Roman Empire. But we cannot explain the intelligence behind such things by using natural selection as an explanation. As Alfred Russel Wallace (the co-founder of the theory of natural selection)

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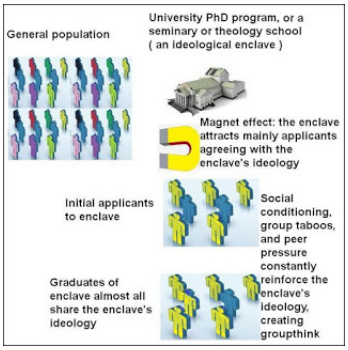

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pointed out in the nineteenth century, natural selection can only explain features that are needed for an organism to survive in the wild.

So we have a general mystery that exceeds the mystery of the Flynn effect. The mystery is: why has human intelligence increased at various times in ways we cannot explain?

I will now suggest a highly unconventional hypothesis to explain the Flynn effect. The Flynn effect may be evidence that human intelligence is being gradually increased by some external reality that is a partial or major source of human consciousness. Such a reality may be gradually increasing human intelligence to help us cope with an increasingly complex world, or to help us fulfill some human destiny that requires greater human intelligence.

To understand this hypothesis, I must first explain what is meant by neural reductionism, and why there are strong reasons for rejecting this assumption. Neural reductionism is a theory of the mind and brain that you have probably heard advanced many times. It is the idea that mind or intelligence is purely a product of the brain. A neural reductionist believes that your brain generates your intelligence rather like your liver secretes bile.

But there are quite a few reasons for doubting this simple theory. One reason is that we cannot plausibly account for very long-term human memories through any neurological explanation, mainly because (as discussed here) very rapid molecular turnover in the brain should make the brain an unsuitable substrate for a 50-year storage of memories, or even a storage of memories lasting longer than two years. Another reason is that the physician John Lorber documented many cases of people who functioned well even though the great majority of their brains were destroyed by disease. Another reason is that neural reductionism cannot account for psychic phenomena such as near-death experiences, out-of-body experiences, and extra-sensory perception (the latter something very well-demonstrated in convincing laboratory experiments such as those done by Professor Joseph Rhine, which have never been successfully debunked).

Suppose we consider possibilities other than neural reductionism. It may be that our consciousness and intelligence comes largely or mainly from some mysterious external reality outside of our brains.

Let's imagine a 10-year-old child who enters some data into a smartphone. If you ask the child where that data is stored, the child will say something like: “Why in the smartphone, of course – where else could it be?” But depending on the smartphone app being used, the data may not be stored in the smartphone. It could be the app uses a wi-fi connection to connect to an external web server that connects to a relational database server which stores the data the child has entered into the smartphone. But the child knows nothing of such an unseen infrastructure, so of course when she is asked where her data is stored, she answers that it is in the smartphone. Similarly, our long-term memories and intelligence may depend on some mysterious consciousness and information storage infrastructure that is outside of our brains. But since a scientist knows nothing of such an infrastructure, when he is asked where our memories are stored, he answers: “In the brain, of course – where else could it be?”

And if the child uses her smartphone to do a math problem, and you ask her, “Where was the intelligence that helped you do that?” the child will

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
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- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
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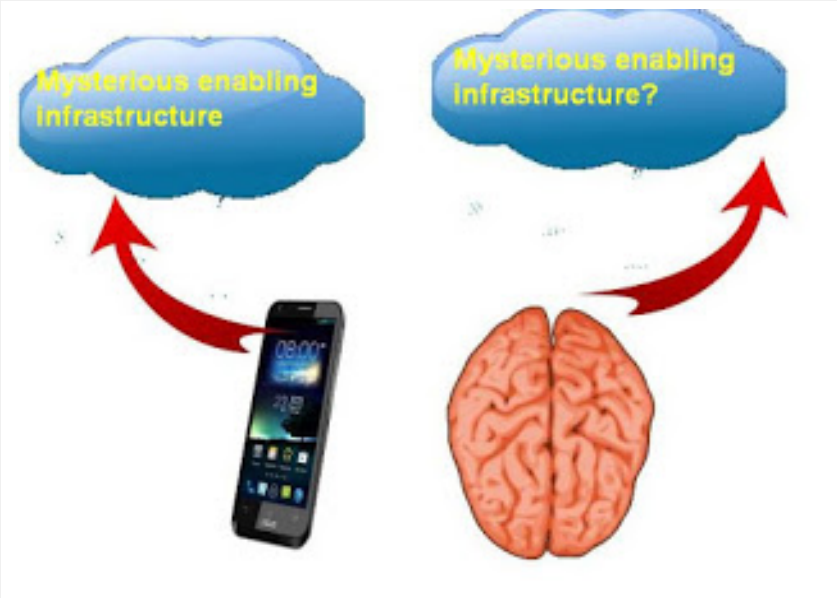
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

answer, “In the smartphone, of course – where else could it be?” But the actual facility that helped her may be a remote Google server thousands of miles away. Similarly, if a scientist is asked where is the intelligence that led you to ponder some cosmic mystery, he will answer, “In the brain, of course --- where else could it be?” But our minds may depend on some mysterious intelligence infrastructure outside of our bodies.



Once we start thinking along these lines, that our intelligence may come partially or largely from some mysterious external reality outside of our brains, we have opened the door to a radical new hypothesis to explain the Flynn effect. The hypothesis is this: some external reality that is the source of our consciousness may be deliberately causing a gradual increase in human intelligence. This may be to help us cope with an increasingly complex world. Or it may be to help us fulfill some great destiny that is planned for humanity. The same reality may have increased human intelligence at the time when humans first started to build cities.

The idea that human intelligence is being gradually increased by some mysterious external power seems like a reasonable hypothesis. But there may be one thing that argues against the very idea that human intelligence is gradually increasing.

I refer, of course, to the inane drivel that is the 2016 American presidential campaign.

Postscript: The average person probably has the idea that the human brain evolved until it was large enough to allow for thinking and spirituality, at which point human culture and religion first started to emerge. The link here reports "anatomically modern" human skull remains dated to 160,000 years ago, with what a scientist describes as "full-fledged *Homo sapiens* features." But humans did not start engaging in symbolic behavior until about 80,000 years ago. How do we explain that? It's as if humans got some big intelligence boost 80,000 years after hominid brains reached their largest size.

Posted by Mark Mahin at 12:56 PM No comments:

Labels: consciousness, evolution, Flynn effect, human intelligence

Wednesday, July 20, 2016

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

Randomness, Survival of the Fittest, and the Origin of Biological Complexity

According to Neo-Darwinism, the astonishing biological complexity of the natural world arises from a combination of random mutations and natural selection. The idea is that random mutations produce random changes in organisms, and that natural selection (or survival of the fittest) causes helpful random mutations to proliferate. Neo-Darwinists maintain that this can account for the appearance of useful complex features such as wings, eyes, elephant trunks, giraffe necks, and so forth.

Let us try to imagine a situation that might involve a combination of randomness and survival of the fittest. Imagine you are a football coach at a college or university. Every year many students sign up for the football team, hoping to gain the on-campus prestige enjoyed by college football players. This provides you with a great deal of randomness. Some of these applicants will be strong, and some will be weak. Some of the applicants will be in good physical shape, and some will be in poor physical shape. Some will be fast, and some will be slow.

But where does the "survival of the fittest" come into play? That happens with your discretionary roster cuts. Given this random pool of applicants, you will be able to create a "survival of the fittest" effect by cutting from the football roster any aspiring team members who are too weak or slow or who cannot catch or pass or punt the football.

Now let's suppose the randomness of the applicant pool and the roster cuts are the only factors involved. You simply take your starting pool of aspiring football players, subject them to various physical tests, and cut from the roster a certain number of people who fail to perform well on the physical tests. You do nothing else. So you have randomness, and survival of the fittest. Will this result in a winning football team, one that produces the coordinated functionality needed to win football games?

Of course, it will do no such thing. Producing a winning football team requires both design and a huge amount of coordination. The design comes from designing particular football plays that your team will execute. The coordination comes when particular players are assigned particular positions, and these players repeatedly practice smoothly coordinated football plays. Without this design and coordination, your football team will be a mess. When a play starts, players will just wander about, without anyone knowing whether they are supposed to block, throw the ball, catch the ball, or punt.

So clearly for a football coach, randomness plus survival of the fitness does not yield coordinated functionality. But someone may argue that this analogy is inadequate, because it only involves survival of the fittest and does not involve the idea of *differential reproduction*. Differential reproduction means that those who are more fit to survive will reproduce more frequently, and those who are less fit to survive

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

will reproduce less frequently. Differential reproduction is basically the same as natural selection, and is actually a better term for such a thing (since nature does not actually choose or select anything, natural selection is not a literally accurate term, even if it may be accurate in some figurative sense, to at least some extent).

So let's imagine a better analogy, one that will include both randomness and differential reproduction. Let us imagine a tall skyscraper filled with monkeys who have been trained to type on laptop computers. Let us imagine that each laptop has an email program or full-screen instant messaging program on its screen. Let us imagine that all day long the monkeys are randomly striking the keys, with such activity being encouraged because the more typing the monkeys do, the more food appears. (This could easily be accomplishing by programming the laptops to count the keystrokes and send a message to some feeding apparatus, whenever a hundred keystrokes were detected.) The random typing of the monkeys gives us all the randomness we could ever ask for.

But what about the differential reproduction – how can we get that? We can simply imagine that there is a roving editor walking around the skyscraper, examining the laptop screens. Whenever the editor finds a laptop screen that gives some good prose, the editor presses some keystroke on the laptop that sends out this typed output to quite a few other laptops in the building, via email or instant messaging. So if the output on the laptop screen is a decent sentence, maybe such a sentence gets transmitted to 10 other laptops, and put on the screens of these laptops. If the output on the laptop screen is a decent paragraph, maybe such a sentence gets transmitted to 100 other laptops. So this is differential reproduction, a kind of natural selection in which fortunate random output gets reproduced much more frequently.

Will such a system result in the large scale appearance of coordinated complexity? Under such a system would we expect to eventually see lots of laptop screens on which there were good poems, letters, essays, articles, recipes, or intelligent pieces of computer code? Absolutely not. Despite the combination of randomness and differential reproduction, we should not expect any monkey's laptop to have anything but gibberish on it. Even if such a system were kept running for a billion years, we would not expect for coordinated complexity to appear to any large degree.

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

We can think of two general reasons why this would be true. The first reason is what we may call the discarding of preliminary implementations. If we are to imagine that our roving editor acts like natural selection in the natural world, we must imagine that the editor would reward only work which had received a certain level of functional quality. So if a monkey's laptop contained a sentence such as “I think what we should do about the gun violence problem is nanae anowe anslweonw assfw,” such a sentence (a preliminary implementation of a functional sentence) would not be rewarded with increased reproduction. In order for the random output to be rewarded with increased reproduction, it would have to have a high degree of ordered, coordinated complexity, a level of functionality very, very unlikely to be achieved by chance.

The second reason why this skyscraper of typing monkeys would not result in large-scale coordinated complexity is that in the very rare cases in which random output produced functionality that was rewarded with increased reproduction, the randomness of the typing monkeys would further degrade that functionality over time. So if a monkey ever typed a good sentence, and that sentence got transmitted to the screens of 10 other monkeys, the subsequent random typing of those monkeys would quickly degrade the coordinated complexity, and tend to gradually turn it into uncoordinated gibberish.

Similar reasons cast great doubt on the claim that in the natural world, some combination of random mutations and natural selection can produce coordinated complexity. The discarding of preliminary implementations is something we should expect to be constantly occurring in a natural world ruled by blind chance. For example, if an eyeless organism started to develop a light-sensitive dimple that could be the start of an eye, we would expect natural selection to throw away such a useless feature – unless by some incredibly improbable coincidence it happened to have almost simultaneously arrived by chance with other changes needed for some earliest version of functional vision (changes such as an optic nerve conveniently stretching from such a feature to the brain, and also quite a few changes in the brain needed to process such visual input). To give another example, if an organism by chance developed a wing stump, we would expect natural selection to discard such a feature, as it would provide no immediate benefit. The idea that natural selection will tend to discard anything that isn't useful comes from Darwin himself.

Imagine you are hired to work in a junkyard, and you are told to build useful things from the odds and ends lying around. But there's a problem: you are closely watched by a dimwitted foreman with no foresight or imagination, a guy you nickname “the Brainless Boss.” You start out by finding an axle and two wheels, and fit them together. You think to yourself: this can be the start of a good wagon or cart. But then your foreman sees what you are doing, and throws it away in the trash bin. “Not useful – make something useful,” the foreman says. You then find some wood, and nail together three pieces of wood to make a U-shape. You think to yourself: this can be the start of a

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

bookshelf. But your foreman arrives, and throws what you have made into the trash bin. "Not useful – make something useful," the foreman says. You realize that your chance of making anything useful are not good, because the "Brainless Boss" will always be discarding your preliminary implementations. So it would be in the natural world ruled only by chance and natural selection. Lacking any foresight or imagination, natural selection would always be acting like this "Brainless Boss," discarding preliminary implementations that were not yet useful.

Similarly, in the natural world we would expect that random mutations would vastly more often degrade coordinated functionality than to improve it. The more complex and coordinated a piece of functionality is, the more likely it will be that random changes will degrade it rather than improve it. For example, random changes in computer code will be 100 times more likely to harm the code than to help it.

Part of the appeal of Neo-Darwinism is its simplicity. Neo-Darwinism tries to explain the appearance of biological complexity by giving us the real simple equation that randomness plus survival of the fittest eventually yields astonishingly coordinated wonders of biological complexity. The problem is that this equation is not accurate. Randomness plus survival of the fittest does not yield coordinated functionality. The answer to the origin of biological functionality must be something vastly deeper or more complicated than this simplistic little equation.

Posted by Mark Mahin at 11:30 AM No comments:

Labels: Darwinism, evolution, natural selection, randomness

Monday, February 15, 2016

The Gigantic Missing Link of Biological Life

The discovery of DNA was one of the great triumphs of science. But ever since this discovery there has been a strange trend which we may call "DNA inflation," "DNA exaggeration," or even "DNA apotheosis." The trend has been to carelessly describe DNA in ever more grandiose terms, regardless of the actual facts. A particularly absurd and careless example of such talk is found on page 31 of the book "Super Genes" by Deepak Chopra and Rudolph E. Tanzi. The authors write the following:

DNA, as the "brain" of the cell, is ultimately in charge of every process...The DNA that's neatly tucked inside each cell is something magnificent, a complex combination of chemicals and proteins that holds the entire past, present, and future of all life on our planet.

This is almost completely inaccurate. DNA is nothing like a brain, and is not even like a computer. DNA is not a "combination of chemicals and proteins," because it does not contain a single protein. Instead DNA contains chemical information used by the body when it makes

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

proteins. And DNA does not contain "the entire past, present, and future of all life on our planet."

A statement this outrageous is not very common, but it is very common for writers to inaccurately describe DNA. One very common claim is that DNA is a blueprint that lays out the complete specification of the human body. Another common claim is that DNA is a recipe (or a library of recipes) for making an organism. It is also sometimes claimed that DNA is like a computer program for generating our bodies.

But such statements are not warranted by the facts. Judging from the facts, we must conclude that while DNA uses a code of symbolic representations (the genetic code), DNA is not a blueprint for making a human, is not a recipe for making a human, and is not a program or algorithm for making a human. The facts indicate the DNA is not anything close to a complete specification of an organism, but that DNA is instead something much simpler, mainly just a kind of database used in making particular parts of an organism.

Below are 6 reasons for thinking that DNA is neither a blueprint nor a recipe nor a program for making human beings.

Reason #1: The "language" used by DNA is a minimal feature-poor language lacking any grammar or capability for expressing anything like a blueprint, a recipe, a program or an algorithm for making a human being.

First, let's look at the different ways of specifying a three-dimensional object, and then look at whether any such way could be used by using DNA.

There are two ways in which you can create a specification for building something that will exist as a three-dimensional object. The first way is the blueprint approach, in which you don't specify the steps that must be taken to create the object, but merely specify how the object will look once it is constructed. You can create a kind of blueprint by creating a drawing or image that will specify how the completed object should look. Alternately, you can specify three-dimensional coordinates for each of the parts that will make up the final object. The latter approach is used by video games and in the fancy special effects used in movies. A video game may store a 3D object as a series of 3D coordinates, and then use such coordinates to construct the object virtually.

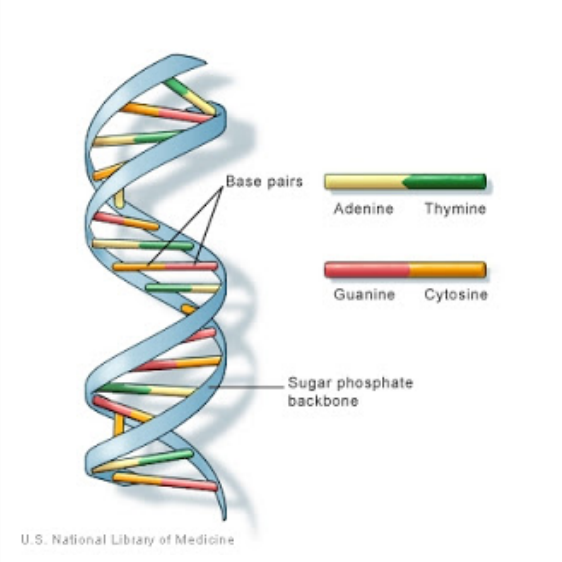
A different approach for telling how to make a three-dimensional object is what we may call the recipe approach or the algorithm approach. When this approach is used, you merely specify a list of ingredients or parts and a list of steps or operations that will be taken using such ingredients or parts. For example, you might specify steps for making a house without using any blueprint for the house. You could specify a list of building materials and a list of exact operations

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

to be performed on those building materials – a set of instructions. If the set of instructions was sufficiently detailed, they might be sufficient to produce some exact type of house.

But the "language" used by DNA is a minimal type of language that lacks any capability for using either of these approaches. Instead of being a rich language capable of great expression, the language used by DNA is pretty much the poorest, most "bare bones" type of language you can imagine. It's a language unsuitable for purposes other than stating lists of chemicals.

Let's look at exactly how the "language" of DNA works (and I used the word "language" in quotation marks because the expression capability is so limited that it may be an exaggeration to even say that it uses a language). DNA is a molecule containing many nucleotide base pairs, as shown in the diagram below. The base pairs can be either adenine, guanine, cytosine, thymine, or uracil.



Combination of these "letters" of the DNA alphabet are used to represent particular amino acids, which are the building blocks of proteins. You have to look at a diagram of the genetic code to understand how particular combinations of these base pairs stand for particular amino acids.

Now this "language" is incredibly constrained. Basically the only thing that you can specify with it are lists of amino acids. To get an idea of how limited this is, imagine if you never learned more than 20 words from your parents or teachers, each the name of some food. Your powers of expression would then be incredibly limited. You might be able to describe some kind of sandwich you wanted by saying something like this:

bread
tomato
lettuce
hamburger
bread

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

But you absolutely could not specify something like a plan for making a building, a complex machine, or a complex 3D object consisting of many parts existing in different coordinates in three dimensional space.

And so it is for DNA. The "language" used by DNA is effectively 24 words or fewer. Twenty of those words are nouns, each an amino acid. The only verbs are something like the words "start" and "stop," and possibly also "use" and "ignore." I include those two words because scientists say that particular genes can be turned on or off.

The table below gives a schematic view of the DNA language. Strictly speaking the only verbs supported are "start" and "stop," but I have also added "use" and "ignore" to cover the idea of genes that are switched on or switched off.

Schematic View of the DNA Language	
Nouns (all amino acids that make up proteins)	**Verbs**
Alanine, Arginine, Asparagine, Aspartic Acid, Cysteine, Glutamic Acid, Glutamine, Glycine, Histidine, Isoleucine, Leucine, Lysine, Methionine, Phenylanine, Proline, Serine, Threonine, Tryptophan, Tyrosine, Valine	Start, Stop, Use (?), Ignore (?)

You can practice at talking in the DNA language. Here is the algorithm:

1. State any one of the twenty amino acids in the list above.
2. Repeat step (1) any number of times.
3. When you're done, say "Stop."

Get the picture? Below are some examples of "talking in the DNA language."

lysine, proline, lysine, valine, serine, tryrosine, stop.
tryosine, valine, proline, lysine, valine, serine, valine, tryrosine, stop

When you try this a few times, you may realize the very small powers of expression of this tiny little DNA mini-language.

Consider the "blueprint" approach of specifying a three dimensional object. A piece of DNA cannot specify that some particular body part should exist at some position in 3D space, because the DNA has absolutely no way of expressing positional coordinates. There is no way to say "behind," "below," "above," or "in front of" using DNA, nor is there any way of specifying how much farther something might be behind, below or above something else. Not only is DNA language incapable of expressing where a nose should be located, the language also cannot even express the idea of a nose. All that DNA can do is to specify some proteins that might be used by the nose. Even that specification is incomplete, because DNA only tells which amino acids are used by a particular protein – it does not specify the shape of

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

a protein (proteins typically have extremely complicated 3D shapes involving lots of folding and twisting).

But what about the "recipe" way of specifying something – can DNA do that by expressing a complex algorithm or list of steps such as we would need to have a program for making the human body? No, it cannot. Expressing an algorithm like that requires a language capability that DNA doesn't have. Consider types of instructions contained in recipes or algorithms:

Repeat this step 13 times
Keep doing this step until condition X is met
Keep doing this step but stop when condition Y is met
Position visible part X so that it is connected to visible part Y

Such ideas cannot be expressed by the "bare bones" language of DNA, which can only express lists of amino acids used to make proteins or nucleic acids.

It seems clear, then, that the language limitations of DNA mean that it cannot be something that expresses a blueprint for a human being or a recipe for making a human being. DNA is not a program for making a human.

Reason #2: Even if the "language" used by DNA had the capability of expressing a blueprint or recipe or program for making a human, there would be nothing that we know of capable of interpreting such instructions.

An important fact to consider is that a list of instructions is not sufficient by itself to cause something to get done. You always need some sophisticated agent smart enough to interpret the instructions and execute them. We know this is true for something like a food recipe. Obviously an apple pie won't get cooked just because you have an apple pie recipe on your table – you need a human smart enough to read those instructions and execute them. But what people sometimes forget is that something similar holds true even for computer code. If I write a computer program in some new language called Lingua, just putting that source code on my computer will never cause the program to run. I would also need to have on my machine a highly sophisticated piece of software called an interpreter, something that is reading each of those instructions, and causing some corresponding action to be taken.

What is the relevance of this to DNA? The relevance is that not only do we know of no capability that DNA's "language" has for specifying anything like a three-dimensional blueprint or an algorithm for making a visible three-dimensional object, but we also know of no capability in the body for interpreting such instructions if they existed. So in order for DNA to work as a program for generating the human body, we would need two things: (1) some capability by which DNA could express complex instructions for making visible three-

dimensional objects (which are apparently completely beyond the limitations of DNA's feature-poor, minimalist language); (2) some other capability by some other unknown agent capable of acting as a highly sophisticated interpreter of these complex instructions. Neither of these things is known to exist.

It would seem, therefore, that the idea that DNA acts as a program or algorithm for generating the human body is not just impossible, but doubly impossible.

Reason #3: Despite cataloging the entire human genome, and exhaustively analyzing it, scientists have not discovered any part of DNA where a blueprint of the human body or a recipe for making humans is stored.

The Human Genome Project was a federally funded project that completed in April, 2003, after cataloging the entire human genome (all parts of DNA). It was followed up a federally funded ENCODE project designed to further analyze DNA. The results were gradually released over the next decade. Now with all this exhaustive study and analysis, we would expect that if there existed such a thing as a blueprint for the human body in DNA or a recipe for making the human body in DNA, that it would have been discovered. But no such thing has been discovered. We have discovered in DNA mainly just a list of chemicals used in constructing proteins, not anything like a specification specifying the body plan of humans or how to construct the intricate machinery of the human body.

When we look at the genes that are most commonly cited as something that may constitute something like body plan information, we find meager evidence indeed: the murky case of what are called hox genes. It has been claimed that hox genes “control the body plan of an embryo along the cradial-caudal (head-tail) axis” by means of a tiny area called the homebox. But the evidence for this claim is very weak. Geneticist Jerry Coyne says this about hox genes: “Their overall function in development - let alone in evolution - remains murky.”

I may note that the “homeobox” supposedly having some relevance to the human body plan is only 180 nucleotides long (the equivalent of about 60 words in the DNA language). This is millions of times too small to store anything like a plan for the human body.

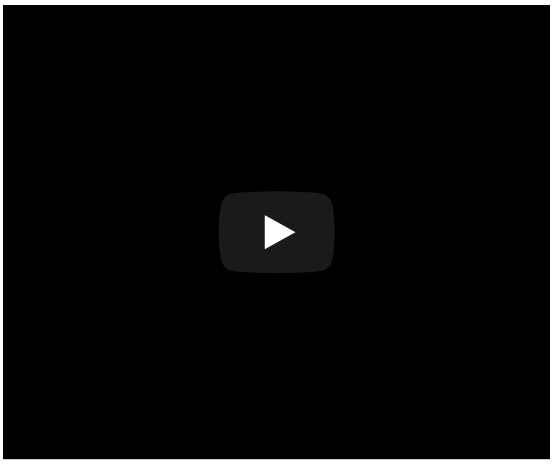
The unwarranted claims about Hox genes are summarized by Joseph Hannon Bozorgmehr at the Laboratory of Systems Biology and Bioinformatics at the University of Manchester (author of this scientific paper). Bozorgmehr writes the following :

Genes code for proteins and RNAs. They don't code for brains, limbs or body plans. Yet many scientists insist that Hox genes, and other transcription factors, are responsible for "laying out the floor plan" of the organism when all they are observed to do is activate genes in

already established segments of the developing embryo. We have known this for 20 years. So why are the 39 Hox genes still portrayed as determining the geometry of anatomy when all they do is bind to DNA and RNA polymerase to affect gene expression in ontogeny?

The meager and murky evidence regarding hox genes notwithstanding, our scientists have not found any clear evidence that DNA stores a blueprint for the human body, a recipe for the human body, or any type of program or algorithm like a body plan. If DNA stored such a thing, there would be abundant evidence of it.

In the short video below, Jonathan Wells (a PhD in molecular and cell biology from the University of California at Berkeley) states very clearly that DNA does not map out a body plan. He states "the body plan, as far as we know, is not in the DNA" (0:33), and states that DNA is "not a blueprint, it's more like a parts list" (1:40).



Reason #4: If DNA stored a human blueprint or human recipe or body plan, humans would have a much larger DNA than simpler organisms; instead, the opposite is often true.

If body plans are stored in DNA, we should expect that the size of an organism's DNA should be proportional to the size and complexity of an organism. For the same reasons that the blueprints of a skyscraper use much more paper than the blueprints for a house, under a "DNA has the body plan" assumption we should think that the human DNA is much bigger than the size of, say, any flowering plant. But astonishingly, the opposite is true. The chart here shows the relative size of the DNA in different organisms. We see that the size of the DNA (in base pairs) in mammals is much smaller than the size of the DNA of many amphibians and flowering plants. We see on this logarithmic chart that the DNA of some amphibians and flowerings plants holds ten times more information than the DNA of humans.

A related comparison is the number of genes in the DNA. According to this link, rice has between 32,000 and 50,000 genes, while humans have only 20,251 genes. That's the opposite of what we would expect if DNA stored body plans.

Reason #5: The DNA size of humans is insufficient to be a blueprint or recipe for the human body with all its complexities.

Astonishingly our biologists have sometimes assumed that DNA is a complete specification for constructing a human body, but I have never once read a biologist consider whether the information size of DNA is sufficient for such a task. The idea that DNA can store a complete specification for a human being will obviously make no sense if our DNA molecules are not big enough to store such a specification, just as it will make no sense to assume that a postcard can store the names of all members of a club if the club has many thousands of members.

It has been estimated that a DNA molecule has an information size of about 700 megabytes. This is not big enough to store a complete blueprint, algorithm, or program for creating a human being. If you use the uncompressed RAW files used in cameras, it will take about 8 megabytes to store a high resolution photo. This means human DNA has an information size needed to store about 100 high-resolution photos uncompressed. This is not big enough to store a complete specification for making the human body. A recently introduced CT scanner requires 320 scans to map a human body, each scan equivalent to such an 8 megabyte photo. But consider also all the microscopic functionality that would need to be specified, and all of the microscopic details. It would seem that it would require many gigabytes to store a complete plan for building a human, not just 700 megabytes.

Reason #6: If DNA stored a recipe or blueprint for making humans, we would probably sometimes see extremely jumbled bodies resulting from mutations, but we don't see such "scrambled humans."

This is the weakest of my six reasons, so I'll discuss it only briefly. All parts of DNA are subject to mutations in which random changes occur because of things such as copying errors and cosmic rays hitting part of DNA. If DNA stored the human body plan, it seems that we should expect to see weird examples of "scrambled humans," such as people born with eyes on their cheeks, people with noses on their chins, people born with ears on their foreheads, and so forth. But we don't see such abnormalities. Genetic mutations can produce serious abnormalities, but the human body seems to be implemented with astonishingly fidelity, more so than we would expect if the body plan for humans was stored in DNA subject to mutations.

The Gigantic Missing Link of Life

The reasons discussed above strongly argue that DNA is not a blueprint, recipe or specification for making a human being. Does this mean that there is nothing like a body plan for making a human? Not at all. Such a plan must exist somewhere. But we don't know where it is located. It does not exist in DNA. Widely described as "the secret of

life," DNA must instead be only one secret of life. There must be some other equally great secret that we have not discovered.

This undiscovered secret – the unknown location of the specification for making a human being – is the gigantic missing link of biological life that we have not discovered.

Where might such information be stored? It might possibly be stored somewhere else in the body, or it might be stored outside of the body. It may well be that the answer lies in some field or force or influence or information system entirely unknown to us.

This gigantic missing link of life can most mysteriously be seen at the moment of life's conception. Once a tiny female ovum has been fertilized by a sperm, how does this fertilized egg know how to turn into a human baby, rather than a million other possible forms? There is absolutely not in DNA any mechanism by which an egg or an embryo can look up a list of instructions to follow based on its age. An egg or an embryo doesn't know how old it is, and doesn't know where to look in DNA to look up appropriate instructions; and DNA does not have instructions organized by biological age, which might be looked up by some egg or embryo that knew its age. DNA has everything written in a language of about 22 words in which 20 of those words are amino acids – not something remotely suitable for stating any instructions other than protein or RNA assembly instructions.

As Jonathan Wells (a PhD in molecular and cell biology) states near the end of this lengthy scientific paper:

"The idea that embryo development is controlled by a genetic program is inconsistent with the biological evidence. Embryo development requires far more ontogenetic information than is carried by DNA sequences."

The problem of how a fertilized egg can progress to a baby is called the problem of morphogenesis. It is an unsolved mystery that modern biology has not given enough attention. The complete answer must involve much more than just DNA, and we have every reason to suspect that it involves something utterly mysterious that we know little or nothing about. Until this mystery is solved, we cannot plausibly claim that we understand either life or evolution.

Postscript: My point about morphogenesis and evolution is pretty much reiterated in this book "Morphogenesis and Evolution," where Keith Stewart Thomson (president of the Academy of Natural Sciences in Philadelphia) stated the following (at the beginning of Chapter 7):

"J. Maynard Smith (1983) has written that 'although we have a clear and highly articulated theory of evolution, we have no comparable theory of development.' I would turn this statement around somewhat

and say that until we have a general theory of development we are unlikely to be able to derive a complete theory of evolution."

Correct, and you could just as easily change that phrase "complete theory of evolution" to "plausible theory of what drives evolution."

In this .pdf file, a professor of Mathematical Biology makes this statement:

"Although genes obviously play a role in development, knowing the genetic make-up of an organism does not allow us to understand the mechanisms of development—we may know that certain genes impart particular properties to certain cells, but how this then leads to tissue-level behaviour cannot be addressed by genetics."

That is basically a fancy way of saying that a fertilized egg does not become a baby by following a body plan stored in DNA.

On page 26 of the recent book *The Developing Genome*, Professor David S. Moore states, "The common belief that there are things inside of us that constitute a set of instructions for building bodies and minds -- things that are analogous to 'blueprints' or 'recipes' -- is undoubtedly false."

Biologist Rupert Sheldrake says this about this issue:

"DNA only codes for the materials from which the body is constructed: the enzymes, the structural proteins, and so forth. There is no evidence that it also codes for the plan, the form, the morphology of the body. To see this more clearly, think of your arms and legs. The form of the arms and legs is different; it's obvious that they have a different shape from each other. Yet the chemicals in the arms and legs are identical. The muscles are the same, the nerve cells are the same, the skin cells are the same, and the DNA is the same in all the cells of the arms and legs. In fact, the DNA is the same in all the cells of the body. DNA alone cannot explain the difference in form; something else is necessary to explain form."

An evolutionary biologist notes that "the long-held belief that genes are the unique determinants of biological form in development and evolution has been challenged by an extensive number of commentators." Among these "extensive number of commentators" are the people mentioned above and the authors of this scientific paper, who note that "gene expression patterns cannot explain the development of the precise geometry of an organism and its parts in space."

Describing conclusions of biologist Brian Goodwin, the New York Times says, "While genes may help produce the proteins that make the skeleton or the glue, they do not determine the shape and form of an embryo or an organism." Massimo Pigliucci (mainstream author of numerous scientific papers on evolution) has stated that

"old-fashioned metaphors like genetic blueprint and genetic programme are not only woefully inadequate but positively misleading." Neuroscientist Romain Brette states, "The genome does not encode much except for amino acids."

In a 2016 scientific paper, three scientists state the following:

"It is now clear that the genome does not directly program the organism; the computer program metaphor has misled us...The genome does not function as a master plan or computer program for controlling the organism; the genome is the organism's servant, not its master....Metaphorically, we can think of the genome as akin to a list of words, a vocabulary, which can be used to build and express a meaningful language; like a vocabulary, a genome by itself has no functional meaning. The genome is thus akin to a toolbox of DNA sequences that provide molecular tools as requested by the internal state of the organism and the state of the environment. One's genes cannot explain one's being: an organism is the expression of a dynamic and ongoing interaction between the state of its environment and its internal state, which includes its past history and its toolbox of DNA sequences."

In the book *Mind in Life* by Evan Thompson (published by the Belknap Press of Harvard University Press) we read the following on page 180: "The plain truth is that DNA is not a program for building organisms, as several authors have shown in detail (Keller 2000, Lewontin 1993, Moss 2003)." C.H. Waddington is described by wikipedia.org as "a British developmental biologist, paleontologist, geneticist, embryologistand philosopher who laid the foundations for systems biology, epigenetics, and evolutionary developmental biology." He stated, "The DNA is not a program or sequentially accessed control over the behavior of the cell." Scientist Jean Krivine presents here a very elaborate visual presentation with the title, "Epigenetics, Aging and Symmetry or why DNA is not a program." Scientists Walker and Davies state this in a scientific paper:

"DNA is not a blueprint for an organism; no information is actively processed by DNA alone. Rather, DNA is a passive repository for transcription of stored data into RNA, some (but by no means all) of which goes on to be translated into proteins."

Geneticist Adam Rutherford states that "DNA is not a blueprint." A press account of the thought of geneticist Sir Alec Jeffreys states, "DNA is not a blueprint, he says." B.N. Queenan (the Executive Director of Research at the NSF-Simons Center for Mathematical & Statistical Analysis of Biology at Harvard University) tells us this:

"DNA is not a blueprint. A blueprint faithfully maps out each part of an envisioned structure. Unlike a battleship or a building, our bodies and minds are not static structures constructed to specification."

"The genome is not a blueprint," says Kevin Mitchell, a geneticist and neuroscientist at Trinity College Dublin. "It doesn't encode some specific outcome." His statement was reiterated by another scientist. "DNA cannot be seen as the 'blueprint' for life," says Antony Jose, associate professor of cell biology and molecular genetics at the University of Maryland. He says, "It is at best an overlapping and potentially scrambled list of ingredients that is used differently by different cells at different times." Sergio Pistoi (a science writer with a PhD in molecular biology) tells us, "DNA is not a blueprint," and tells us, "We do not inherit specific instructions on how to build a cell or an organ." Michael Levin (director of a large biology research lab) states that "genomes are not a blueprint for anatomy," and after referring to a "deep puzzle" of how biological forms arise, he gives this example: "Scientists really don't know what determines the intricate shape and structure of the flatworm's head."

Agustin Fuentes, a professor of anthropology, states the following:

"Genes play an important role in our development and functioning, not as directors but as parts of a complex system. 'Blueprints' is a poor way to describe genes. It is misleading to talk about genes as doing things by themselves."

In statements such as this, scientists "fess up" that the idea of DNA as a human specification is not true. Two other scientists "fess up" in a similar way when they write the following about genes in the journal Nature: "Population genetics is founded on a subset of coding sequences that can be related to phenotype in a statistical sense, but not based on causation or a viable causal mechanism."

Regarding the DNA as blueprint idea wikipedia.org article entitled "Common misunderstanding of genetics" lists the claim that "Genes are a blueprint of an organism's form and behavior" as one of the "common misunderstandings of genetics." Jonathan Latham has a master's degree in Crop Genetics and a PhD in virology. In his essay "Genetics Is Giving Way to a New Science of Life," a long essay well worth a read, Latham exposes many of the myths about DNA being a blueprint or master controller, and points out DNA does not even fully specify a protein. He states, "It is habitually, but lazily, presumed that DNA specifies all the information necessary for the formation of a protein, but that is not true."

Posted by Mark Mahin at 12:45 PM No comments:

Labels: DNA, evolution, genes, genetics, human body plan, morphogenesis, tininess of human knowledge

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Friday, December 25, 2015

The Difficulties in Explaining the Big Leaps in Life's History

I read Bill Nye's book *Undeniable: Evolution and the Science of Creation* to give a well-known author a chance to change my opinion that there is no compelling evidence for the claim that the blind process of natural selection can explain the astounding wonders of biological complexity (for the kind of reasons I discuss here). Looking at the book's index, I found that only 8 pages in the 298-page book discuss natural selection. I didn't find this surprising, because while there is lots of evidence that evolution (or a succession of life forms mimicking evolution) has occurred, the evidence that natural selection is the main explanation for this progression is actually very weak. Natural selection is a real biological effect, which can explain a few things, such as a change in a population of organisms in which a trait held by the minority becomes a trait held by the majority. But natural selection is not very good at explaining the origin of new forms of biological complexity, contrary to what is often claimed.

Looking at the index's first reference to natural selection, I found immediately a very misleading statement by Nye. He states, “Evolution is also not random; it's the opposite of random” (a misstatement he repeats later). No, orthodox Darwinian evolution is, in fact, quite random. When I do a Google search for “definition of random,” the first definition that comes up is: “made, done, happening, or chosen without method or conscious decision.” The synonyms that are listed include “unplanned” and “undirected.” Evolution as described by Darwinian orthodoxy is therefore quite random, as very many evolution enthusiasts have themselves told us over the years.

Nye suggests that evolution isn't random because it “selects” fitter organisms. Using the same type of reasoning, we could argue that hurricanes aren't really random, because they “select” lighter buildings to destroy rather than heavy buildings made of steel and brick. We could also argue that forest fires aren't really random because they “select” wooden buildings to destroy rather than heavy steel buildings. Such reasoning about hurricanes and forest fires would, of course, be quite erroneous and sophistical. It is just as erroneous and sophistical for Nye to claim that evolution (as described by Darwinian orthodoxy) is not random just because it “selects” fitter organisms. The real issue in whether something is random is whether it is blind and mindless, without a plan. The type of evolution Nye believes in is utterly blind and mindless, without any plan; so it is extremely misleading for him to describe it as the “opposite of random.”

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  - September (8)
  - August (8)
  - July (8)
  - June (8)
  - May (8)
  - April (8)
  - March (9)

The first four pages in which Nye discusses natural selection do not give anything like a coherent argument that natural selection can explain biological complexity. In fact, Nye seems to repeatedly veer into attempts to explain natural selection by discussing marketplace and corporate behavior. This is misguided, because corporate and market behavior (such as the "survival of the fittest" of well-designed products) are examples of what is known as artificial selection , which involves conscious decision making and is entirely different from unconscious natural selection. You can in no way validate the power of natural selection by giving examples of artificial selection.

The main problem with believing that natural selection is the main explanation for biological complexity is that the biological world has a thousand marvels of immense coordination, in which components are arranged in extremely coordinated and complex groups of components; but neither natural selection nor random mutations offer any mechanism for coordination. Random mutations can explain why different small components might occasionally arise, but orthodox Darwinism offers no mechanism by which these components would arrange themselves into highly coordinated and complex groups of components. For the orthodox Darwinists there are countless problems of this type: how did nature "climb the staircase" to reach some top level of complex coordination, in such a way so that each step added to the reproductive value or survival value of an organism, so that each step was useful? Under Darwinian assumptions, each step must be useful, or we can't explain it.

One such "climbing the staircase" problem involves the evolution of wings. To the naive mind, it does not appear that a small part of a wing would have any use. Nye tackles this problem, but fails to explain it away. For one thing, his approach involves a kind of cheat. His chapter on the topic is entitled "What Good Is Half a Wing?" Trying to explain just that is cheating, because it is starting halfway up the stairway, when you should be starting at the bottom of the stairway. The question that should be asked is not "what good is half a wing" but "what good is an eighth of a wing" or "what good is a wing stump." To explain this problem under orthodox Darwinian assumptions, one would need to offer a scenario by which a species might progress through this series: (1) no wing; (2) an eighth of a wing; (3) two eighths of wing; (4) three eighths of a wing; (5) four eighths of a wing; and so forth. One would need to explain how each of these progressions involved an increase in either reproductive value or survival value.

Nye is unable to explain such a thing. He offers two ideas to try to help explain the evolution of wings. The first is that organisms began to develop wings to keep them warm. This doesn't work, because that can't explain the first two steps in the stairway; it can't explain why a species would start to evolve a wing stump or just an eighth of a wing. A wing stump or an eighth of a wing is worthless for keeping you warm. If you doubt this, I suggest the following experiment. Break a chopstick in half, and paste a few feathers on it. Then tape that feathered half chopstick on your shoulders, and go out on a cold night. You will not feel any warmer.

The second idea Nye offers to try to explain the evolution of wings is to suggest that partial wings were useful for gliding. This does not work, for two reasons. A lesser reason is that gliding is only useful for certain types of animals (such as tree-dwellers); but it is believed that birds evolved from reptiles that did not live in trees. The larger reason is that

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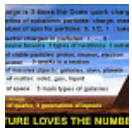
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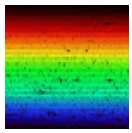
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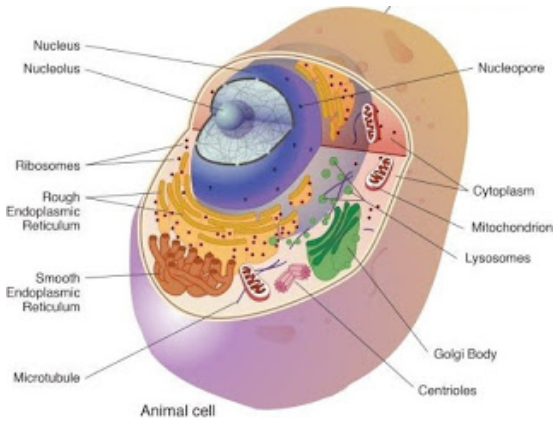
to get even a capability for gliding, a wing must be quite well developed, much more than just a wing stump. So a gliding hypothesis cannot explain why an organism would evolve the first eighth of a wing or a wing stump.

For the orthodox Darwinian, there are countless problems like this wing stump problem – problems of explaining how blind evolution could have reached some improbable target involving a great complex coordination of components. If you shrink the scale, things get much, much worse. The problem of explaining the mechanisms of cellular machinery are vastly more difficult. For example, the basic cellular operation of protein synthesis involves at least six different very complicated components which must all be tightly coordinated: a genetic code, DNA, messenger RNA, ribosomal RNA, transfer RNA, and proteins. The degree of coordination at this microscopic level makes the coordination of muscles and bones in a wing look very trivial in comparison.

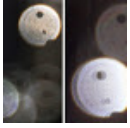
How can all this coordination be explained when Darwinian orthodoxy offers no mechanism for coordination? Nye offers no hint, and I do not find "coordination" in the ten-page index at the back of his book. I see in his index only two pages that discuss biological complexity (pages 60-61), and those pages offer nothing to explain it (other than the not very helpful claim that the "speed of sexual selection" may contribute to biological complexity). I also see no mention of "coordination" in the index of Ridley's 600-page textbook on evolution. But I guess that's not surprising, since explaining biological coordination is not something that Darwinian orthodoxy does in any substantive way.

A better book on evolution is Nick Lane's book *Life Ascending: The Ten Great Inventions of Evolution*. Lane talks about ten leaps that life had to make to get to where it is now, but he sure doesn't persuade a probing reader that natural selection was all that was involved. One of the great leaps he talks about is the leap of prokaryotic cells to eukaryotic cells. Prokaryotic cells are primitive cells, and eukaryotic cells are the vastly more complicated, feature-rich cells which we are made up of. The move from one type to another has been described as like moving from a one-room studio apartment to a millionaire's mansion. We could also explain it as like upgrading from a 1980's version of MS-DOS to the current version of Windows (Windows 10).



A eukaryotic cell (shown above) is vastly more complex than a prokaryotic cell, and may be 100 times larger in diameter.

Here is how Lane attempts to describe this change, using not natural selection as the explanation but the weird theory of endosymbiosis.



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- The Gigantic Missing Link of Biological Life

The world is split in two. There are the eternal prokaryotes and the kaleidoscopic eukaryotes. The transition from one to the other seems not to have been a gradual evolution, no slow climb to complexity...Only a rare and fortuitous event, a collaboration between two prokaryotes, one somehow getting inside the other, broke the deadlock. An accident. The new chimeric cell faced a host of problems...A happenstance solution may have given rise not just to the cell nucleus but also to a tendency to collect DNA and to combine it it in the endless constellations of the magical world around us. Another accident. The world of marvels around us, it seems, springs from two deep accidents. On such tender threads hangs fate. We are lucky to be here at all.

This is the weird theory that seems to be that a very complicated cell arose after one simple cell ate another simple cell and they somehow magically became a nice coordinated cell that was vastly more complicated. It's extremely hard to believe that this would happen by chance. "A quantum leap in complexity by digesting something" is not a plausible theory, particularly since eukaryotic cells are a hundred times larger in diameter than typical prokaryotic cells such as bacteria. That such a theory must be resorted to is further evidence that natural selection is not up to the job of explaining the origin of biological complexity.

Lane's book highlights the fact that the growth of biological complexity is a story of "great leaps." These leaps include:

1. The appearance of the first self-replicating molecules.
2. The appearance of the first primitive cells, and the genetic code they required (a system of symbolic representations).
3. The appearance of photosynthesis -- quite the marvel, judging from the complexity described by Lane, who describes it as five "complex interrelated systems" that "work in sequence...it's an enormously complicated way to crack this particular nut."
4. The appearance of eukaryotic cells vastly more complex than prokaryotic cells – a quantum leap which Lane suggests cannot be explained by a gradual progression.
5. The transition of life from the sea to the land (hard to explain under current thinking, rather like explaining an evolution from earth-based organisms to organisms that live in a vacuum of outer space).
6. The appearance of birds, which has the wing stump problem.
7. The appearance of the human mind (with lots of features that natural selection doesn't explain, because they don't have survival value, as explained here).

Overall, the ability of natural selection and mutations to explain these things is poor. If scientists think otherwise, it's partly because they have long had a habit of underestimating requirements, as Lane does rather laughably when he makes this reductionist claim about the famous "hard problem of consciousness" emphasized by philosopher David Chalmers: "Surely Chalmers' hard problem is actually a problem in biochemistry." As if some chemical equation could explain how Mind arises from matter.

But the very clannish and dogmatic community of evolutionary biologists will probably continue for quite a while to push the Official Party Line that natural selection explains the origin of biological complexity, in a way rather similar to the way that Marxist dogmas (an

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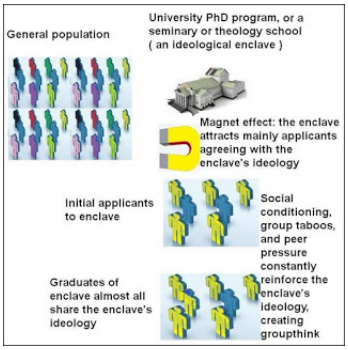

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Official Party Line) would be handed down authoritatively from Moscow in the years of the Soviet Union.

Postscript: See this link for a list of about 50 researchers who are described as "a list of researchers and authors who have one way or another expressed their concerns on natural selection's scope and believes that other mechanisms would better explain evolution processes." It's a very distinguished group (mostly scientists and professors), and each of them has written a book describing their views.

Posted by Mark Mahin at 1:28 PM No comments:

Labels: Darwinism, evolution, natural selection, origin of biological complexity, origin of life

Friday, November 27, 2015

Can Natural Selection Explain the Human Mind?

We are told that natural selection and random mutations can explain the origin of species, including the human species. But does the concept of natural selection work as an explanation of the human mind? Let us examine some aspects of the human mind, each some way in which the human mind differs from the mind of an ape. Then in regard to each of these aspects let us ask: can we explain this aspect of the mind by assuming that it was something that developed because it increased the reproductive likelihood of humans? If the answer is yes, then we will regard that aspect of the mind as something that might be explained through natural selection. If the answer is no, then we will regard that aspect of the mind as something that cannot be explained through natural selection.

Aspect #1: Man's Aesthetic Capabilities

The first aspect for consideration is the fact that human beings have the ability to appreciate beauty in the world, and the tendency to create new beauty by creating works of art. Can we explain this as something that developed because it made humans more likely to survive until they reproduced? It seems not. Compared to things such as speed, smell, sight, and strength, having the ability to appreciate beauty or create beauty seems to be of no value in increasing an organism's likelihood of having offspring.

In fact, it is easy to think of some reasons why having aesthetic capabilities might be disadvantageous from the standpoint of surviving until reproduction. Show me a caveman who tends to spend time enjoying the beauty of clouds, flowers, sunsets, and starry skies, and I will show you a caveman more likely to be attacked by a predator while he is absorbed in such pursuits – and also a caveman who is probably devoting less time to things like food gathering, which improves his survival chances.

So it seems that we cannot explain this aspect of our humanity using natural selection.

Aspect #2: Man's Ethical Tendencies

The second aspect for consideration is the human tendency to follow codes of ethics. Is this something we can explain through natural selection? One could argue that developing an ethical sense would have

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- Cambrian Explosion (5)

made primitive man more likely to survive. For example, if one band of cavemen came into contact with another band of caveman, and both had some kind of ethic of peace and cooperation, it might have been more likely that they would survive.

But you can counteract this argument with another argument just as powerful arguing the opposite. The argument is that a primitive human developing an ethical sense would be less likely to spread his genes about, because he now would feel an inhibition against raping whoever he pleased. Consider a caveman with no sense of morals. He may have felt free to rape whoever he wanted, and that type of conduct is a bonanza from the Darwinian standpoint of spreading your genes around. Make that cavemen a moral person who will not rape, and he will be much less likely to spread his genes about.

So it seems that there is no clear advantage (from a Darwinian natural selection standpoint) to becoming moral. We cannot explain the origin of man's moral sense through natural selection.

Aspect #3: Man's Spiritual Tendencies

The third aspect for consideration is man's spiritual tendencies, his tendency to believe in some higher power. Can we explain this through natural selection? Certainly not. A caveman that develops some spiritual tendency will be no more likely to survive until reproduction than one who has no such tendencies.

Attempts to explain the origin of spirituality through natural selection are typically no better than this very dubious example. The reasoning here is utterly dubious. The author argues that spirituality gave birth to "rules of behavior" that are "necessary to maintain social peace and allow a complex unit consisting of individuals of both sexes and all ages to function in a way ensuring their reproductive success and thus survival." Not convincing at all, since we don't know whether similar rules of behavior would have arisen without spirituality, and since it is not at all clear that spirituality leads to "social peace" (in the modern Middle East, it seems to be doing no such thing). Also it is not clear that "rules of behavior" will improve reproductive success, because a lawless situation where men rape freely is one where men have a high chance of reproductive success. The author is using here the dubious concept called group selection, which many evolutionary biologists say is invalid.

There is no clear and convincing case that can be made that spirituality has any benefit from the Darwinian standpoint of natural selection and survival of the fittest.

Aspect #4: Man's Mathematical Abilities

The fourth aspect for consideration is man's mathematical abilities. Can we explain these through natural selection? Not at all. Having the ability to do math is something that comes in handy when you are a member of a civilization, but is of no significant value to somebody like a cavemen.

Some of the attempts to explain the origin of mathematical abilities through natural selection are empty "just so" stories typically no better than idle speculation. One such attempt is in the book *Radical Evolution* by Joel Garreau, where the author speculates that man developed advanced math capabilities because it was helpful when hunting rabbits by throwing rocks. As someone who has actually tried to

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

catch a rabbit in a field, I find such a speculation to be absurd. Rabbits move in unpredictable directions at high speeds, and if early men hunted rabbits with stones, we can presume that they attacked stationary animals – not by calculating the future position of a running rabbit. Throwing ability is something very different from mathematical ability. Early man was not doing math when he threw rocks at things, any more than you are doing math when you shoot some zombies in a video game.

Aspect #5: Man's Musical Abilities

The fifth aspect for consideration is man's musical abilities. Can we explain these through natural selection? Not at all. Musical abilities have no relevance at all to an organism's chance of surviving until reproduction.

Aspect #6: Imagination

The next aspect for consideration is imagination. In this case one could make a case that imagination does have some value from a natural selection standpoint, on the grounds that an imaginative caveman or man-ape would be more likely to imagine his way to the invention of new tools or techniques with a survival value. For example, an imaginative human predecessor would be more likely to first conceive of rubbing sticks to create fire, or to conceive of attaching a sharp rock to a stick to create a spear.

But when we look at the matter deeper, this case weakens. Consider how innovation might have occurred before civilization arose. One individual might have introduced the innovation, which then would have been adopted by the others in the local group. We have an example of such thing in the first scenes of *2001: A Space Odyssey*, where one imaginative man-ape figures out how to use a bone as a weapon, and the innovation is then picked by all of the local group. But if we assume that such innovations are passed on from generation to generation, it may be a case where you have only innovator for every 100 or 1000 adopters of the innovation. So it's not clear at all that natural selection can be used here to explain some general increase in imagination.

Let's consider a hypothetical case. Man-ape “Harry” has a chance mutation that gives him more imagination. He then invents some new technique or tool that is picked up by his local group, and maybe passed on to subsequent generations. Harry then flourishes, but he's only one person, and there's only a 50 % chance he will pass on this mutation to his descendants. The fact that Harry's innovation is picked up by lots of others does not mean that they will be more likely to be more imaginative themselves. So scenarios such as this aren't very useful in explaining how imagination could become a general human characteristic (and the very idea of an “imagination mutation” is hard to believe in).

Aspect #7: Insight

One could argue that the development of insight can be explained on a basis of natural selection. One might give a case such as this: if some caveman develops insight that some particular hunting technique isn't working, and the reasons why it isn't working, he may be more likely to switch to some new technique that will be more successful.

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

But such reasoning isn't convincing. Here is how organisms typically operate when trying to get some result. They try something to achieve some desired result. If what they are doing works, they will stick with that technique. If it doesn't work, they will try something else. This usually works, even though the animal never has any insight into why the unsuccessful attempt doesn't work. For example, a gorilla trying to get a fruit on a tree may try jumping to get it, and if that fails, the gorilla may try shaking the tree branch. The animal never gets, and does not need to get, any insight as to why jumping didn't work.

So it seems that insight doesn't give any tangible advantage that organisms need to survive. We therefore cannot explain the origin of human insight by using natural selection.

Aspect #8: Intellectual Curiosity

Nowadays people display intellectual curiosity by doing things such as reading books, doing web searches, and doing experiments. But how would some caveman have displayed intellectual curiosity? He typically would have displayed intellectual curiosity by physical exploration. But would such exploration have increased the likelihood of reproductive success? Probably not, because before the rise of civilization, physical exploration was extremely dangerous. There are all kinds of ways in which some exploring cave man could die from exploring – dying from the cold, dying from animal attacks, dying from a fall, or dying from exploring some place with too little available water or food. So no clear case can be made that we can explain intellectual curiosity on any grounds of natural selection. Intellectual curiosity is not a biological adaption that helped an organism flourish in its environment, and it is only such adaptions that can be explained through natural selection.

Exploring what's on the other side of that hill was very dangerous

Conclusion

When we look at the main ways in which the human mind differs from the minds of apes, we find that we cannot explain the characteristics of the human mind through natural selection. Evolutionary biologists will sometimes make statements that come very close to admitting such a thing. If you ask an evolutionary biologist whether Darwinian evolution and natural selection can explain the human mind, such a biologist will typically go into “Darwin defense mode” and claim that the human mind can be explained in such a way. But when writing about the likelihood of intelligence evolving on other planets, some of these biologists (such as Dobzhansky, Mayr and Simpson) said that we should not expect intelligence to evolve elsewhere in the galaxy. See here for an example. By making such statements, such biologists were inadvertently

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

admitting that natural selection does a very poor job of explaining the human mind. If natural selection did a good job of explaining the human mind, we should expect no evolutionary biologists to say that intelligence is rare in the universe.

The origin of the human mind and human consciousness is one of the deepest mysteries of the universe. We could only explain something so deep by using some very deep principle or principles. But natural selection is not such a principle. Natural selection is instead a very shallow principle, a principle that can be stated in only a few words, words such as "fit stuff proliferates, unfit stuff doesn't." We should not expect to explain the deep mystery of the origin of the human mind through a principle so shallow, just as we should not expect to explain the deep mystery of the origin of the universe (the Big Bang) by using some shallow principle such as "stuff happens."

Postscript: In this post I forgot to mention an additional aspect of our humanity that natural selection cannot explain: our language ability. While one might be able to explain a tiny-vocabulary language through natural selection, it's hard to explain the development of language with such rich grammar and vocabulary. For a caveman, it's quite sufficient to be able to grunt a few words such as some word meaning "bear." A caveman doesn't need to make statements like, "Heads up, my friends, I think I see a great big bear approaching on the horizon." Below is the beginning of a relevant blog post by Terrence W. Deacon:

Since Darwin's time, the human language capacity has been a perennially cited paragon of extreme complexity that defies the explanatory powers of natural selection. And it is not just critics of Darwinism who have argued that this most distinctive human capacity is problematic. Alfred Russel Wallace—the co-discoverer of natural selection theory and in many ways more of an ultra-Darwinian than Darwin himself—famously argued that the human intellectual capacity which makes language possible, is developed to a level of complexity that far exceeds what is achievable through natural selection alone.

Postscript: See the link here for a 2-sentence statement signed by hundreds of scientists and PhD's. The statement states exactly the following:
We are skeptical of claims for the ability of random mutation and natural selection to account for the complexity of life. Careful examination of the evidence for Darwinian theory should be encouraged.

Posted by Mark Mahin at 1:34 PM No comments:

Labels: Darwinism, evolution, natural selection, origin of Mind

Thursday, September 24, 2015

New Scientific Paper Is Bad News for "Blind Watchmaker" Theorists

The "blind watchmaker" thesis advanced by people like Richard Dawkins is that we can believe the most remarkable products of evolution were produced without any intelligent designer being involved, because natural selection (with the help of random genetic mutations) is capable of acting like a designer. According to such a thesis, natural selection and random mutations are the "blind watchmaker." But do we actually have good evidence that natural selection and random mutations are capable of such creative marvels, that they are capable of acting like a watchmaker?

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

Below I will look at some of the things that are typically cited as evidence that natural selection and random mutations can act like a watchmaker, and explain why they don't work to establish such a thesis.

You don't show that natural selection and random mutations acted like a watchmaker by discussing that some disease has evolved to be more antibiotic resistant.

One item commonly cited to support the idea of the power of natural selection is the fact that certain diseases have evolved to become more antibiotic resistant. But the changes that a microorganism needs to make to become antibiotic resistant are trivial from a structural standpoint (compared to the changes needed for the evolution of something like the human eye or the human brain). Antibiotics are designed in the lab to exactly conform to a particular microorganism, rather in the same way that a particular key is designed to match a particular lock. It is therefore often relatively easy for a microorganism to change in some way that makes it resistant to an antibiotic, just by changing a little so that the "key no longer fits the lock." In other cases, the bacteria just chemically neutralizes the antibiotic, which doesn't require any new watch-like functionality in the microbe.

You don't show that natural selection and random mutations acted like a watchmaker by discussing some change in the appearance of moths.

Another item commonly cited to support the idea of the power of natural selection is the fact that moths have evolved to have camouflage that matches trees that have been blackened by industrial pollution. But any change in the appearance of an organism is a merely cosmetic type of change that is very trivial compared to the changes needed for the evolution of something like the human eye or the human brain. Color changes in moths may show that natural selection and random mutations may act as a "watch painter," but does not show that they can act as anything like a watchmaker.

You don't show that natural selection and random mutations acted like a watchmaker by discussing some change in the digestive capabilities of microorganisms.

The longest ongoing lab experiment on evolution is one that has been run by Richard Lenski at Michigan State University. The experiment has recorded something like 50,000 generations of bacteria. The main example of evolutionary change shown is that somewhere along the line the bacteria developed an ability to "metabolize citrate." But that is very trivial compared to the changes needed for the evolution of something like the human eye or the human brain. So such a finding does not at all show that natural selection can act like a watchmaker, nor does any other thing discovered by Lenski.

You don't show that natural selection and random mutations acted like a watchmaker by discussing some change in the lactose intolerance of humans.

The claim that there is evidence for a change in the lactose intolerance of humans is one of the first things that comes up when I do a Google search for evidence for natural selection. But even if such evidence exists, it is only evidence of a minor change, not something that can be used to establish the thesis that natural selection and random mutations can act like a watchmaker.

You don't show that natural selection and random mutations acted like a watchmaker by discussing some change in the age of first reproduction (AFR) for humans.

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

The claim that there is evidence for an earlier age of first reproduction (AFR) in humans is another of the first things that comes up when I do a Google search for evidence for natural selection. But even if such evidence exists, it is only evidence of a minor change, not something that can be used to establish the thesis that natural selection and random mutations can act like a watchmaker.

You don't show that natural selection and random mutations acted like a watchmaker by discussing any changes whatsoever in microbes.

Here I may simply note that to demonstrate that natural selection and random mutations acted like a watchmaker you actually have to show that they make dramatic innovations in visible organisms. No microscopic changes in organisms too small to see can properly be compared to the manufacture of a visible watch.

You don't show that natural selection and random mutations were like a watchmaker by discussing changes in the beaks of finches.

Darwin observed that on different islands in the Galapagos, different finches had different sizes for their beaks. But this doesn't show any "watchmaker" capability for natural selection and random mutations. For one thing, the gene pool may have already had a variety of genes for a variety of beak sizes, before such finches even got on these islands. For another thing, such a variation doesn't show that natural selection and random mutations produced the innovation of the finch beak. If Darwin had observed an animal without beaks evolve into an animal with beaks, that might have been a different matter.

The claim that observations of differences in finches sparked Darwin's theory is incorrect. The differences between the finches was not even mentioned in *The Origin of Species*. On page 134 of his recent biography of Darwin, A.N. Wilson states the following:

Peter and Rosemary Grant, evolutionary biologists from Harvard University, spent twenty-five summers studying these birds....They revealed that the beak changes were reversible -- this is hardly 'evolution.' Beaks adapted from season to season, depending on whether droughts left large, tough seeds, or heavy rainfall resulted in smaller, softer seeds.

You don't show that natural selection and random mutations were like a watchmaker by merely showing that natural selection has occurred.

Some scientists try to look for statistical evidence of natural selection in the genome. There have been many such studies, and the statistical approaches used are a matter of controversy. I merely note that you do not at all prove that natural selection and random mutations can act like a watchmaker simply by showing that natural selection exists or that it can have measurable effects. It's still perfectly possible that natural selection exists but is entirely incapable (even with random mutations) of producing impressive macroscopic biological functionality such as the human eye or the human brain.

When people try to show that natural selection and random mutations can act like a watchmaker, they typically follow the same general pattern. They present a few examples of microevolution (small scale changes) that they claim are caused by natural selection and random mutations, and then imply that we can assume that macroevolution (dramatic structural or intellectual innovations) are also caused by natural selection and random mutations. This is a little like someone showing that a horse can jump over a puddle, and then asking us to infer from this that a horse can jump over a lake. It is all too possible that natural selection and random mutations are capable of producing minor examples of microevolution but not capable of producing the more dramatic

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

examples of macroevolution such as the appearance of the human eye and brain.

But is there any way that you could prove natural selection and random mutations act like a watchmaker? Yes, in theory there is. But it has never been done, and would be a nightmare to do, as it would take ages.

Imagine how the project might be executed. After building some special testing environment (perhaps some special large building or zoo), you would start out with a population of some large species with a lifespan of more than decade. You would take samples of the DNA of each organism in such a population. You would then monitor such a population over many generations, frequently taking DNA samples to see how the DNA was changing. Since a generation for such organisms would take at least a year, the project would have to probably last for thousands of years. All in all, it would be a project more difficult than landing men on Mars. No one has ever done such a project, or even one tenth of such a project.

Darwinists say that natural selection is aided by random changes in DNA caused by things such as random mutations and copying errors. There's a simple two-word phrase that we can use to concisely describe such random variations in a genome. The phrase is "DNA typos." Even though such changes are not caused by someone typing the wrong key on a keyboard, the underlying effect is very much analogous to the effect produced when you type the wrong key on your keyboard – a random change is made in a previous body of information.

So here is the equation that Darwinists want you to believe in:

DNA typos + "survival of the fittest" = the appearance of amazing new functionality more intricate than a watch (for example, the human eye and the human brain).

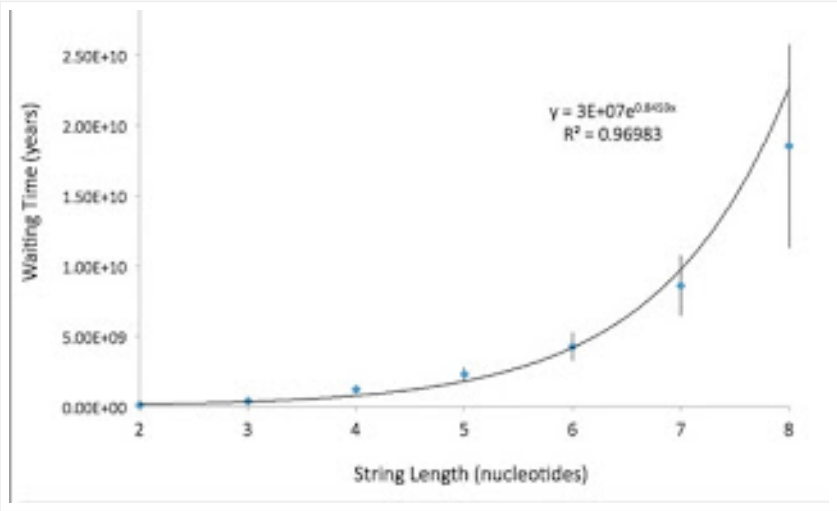
There is something very implausible-sounding about this equation. It doesn't sound right; it doesn't ring true to our ears; and the validity of this equation has not been proven. One reason it doesn't sound right is that 99.99% of all typos degrade information rather than improve it. (As the paper cited in the next paragraph says, "It is now generally recognized that beneficial mutations are rare, and that high-impact beneficial mutations are extremely rare.")

Last week four scientists (one from Cornell University) published a scientific paper entitled "The Waiting Time Problem in a Model Hominem Population," which was published in the journal Theoretical Biology and Medical Modelling. Using a computer simulation, they "simulated a classic pre-human hominin population of at least 10,000 individuals, with a generation time of 20 years, and with very strong selection (50 % selective elimination)." They were basically trying to see how long it would take before you got a mutation consisting of two nucleotides (which is a fairly minor mutation, only some tiny fraction of the mutations needed for the evolution of human intelligence). This is called the "waiting time problem." The authors summarize their results as follows:

Biologically realistic numerical simulations revealed that a population of this type required inordinately long waiting times to establish even the shortest nucleotide strings. To establish a string of two nucleotides required on average 84 million years. To establish a string of five nucleotides required on average 2 billion years. We found that waiting times were reduced by higher mutation rates, stronger fitness benefits, and larger population sizes. However, even using the most generous feasible parameters settings, the waiting time required to establish any specific nucleotide string within this type of population was consistently prohibitive.

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

Here is a visual from their paper, which shows a "waiting time" of some 5 billion years to get a crummy little six-nucleotide mutation.



This is a result that positively *screams* at us that natural selection and random mutations aren't up to the job of being a watchmaker. In order for us to explain the marvels of evolutionary innovations, we should begin to think about principles far deeper than random mutations and natural selection.

Part of the problem is that the early human population was believed to be very small, and the smaller the population, the harder it is to get natural selection and random mutations to work as an explanation for dramatic biological innovations. As the authors of the paper say at the end of their paper:

In small populations the waiting time problem appears to be profound, and deserves very careful examination. To the extent that waiting time is a serious problem for classic neo-Darwinian theory, it is only reasonable that we begin to examine alternative models regarding how biological information arises.

But you may protest: *I can't believe that our evolutionary biologists may have blundered by giving us the wrong explanation of the main cause of evolution.* But consider all the silliness going on in theoretical physics and cosmology. Quite a few of our theoretical physicists try to sell the silliest theory imaginable (the groundless theory of parallel universes, that there are an infinite number of copies of you and me). Quite a few others bombastically sell theories such as string theory (for which there is no compelling evidence). Sometimes lacking in the intellectual humility they should have, our cosmologists often claim to know details about the first second of the universe's history, which they back up by overselling (and routinely describing as factual) a dubious, problematic theory (the cosmic inflation theory) for which there is no good evidence (although there is evidence for the broader idea of the Big Bang). Many of our theoretical physicists and cosmologists also try to sell us almost infinitely extravagant multiverse theories which actually explain nothing. Such thinkers even sometimes make highly incorrect statements while selling such groundless theories, such as this outrageous misstatement: "It is important to keep in mind that the multiverse view is not actually a theory, it is rather a consequence of our current understanding of theoretical physics." So why should you not think that our swaggering evolutionary biologists such as Dawkins have been guilty of the same type of intellectual sins – sins such as explanatory overconfidence and overselling of dubious explanations which they haven't proven?

Postscript: See the link here for a 2-sentence statement signed by hundreds of scientists and PhD's. The statement states exactly the following:

We are skeptical of claims for the ability of random mutation and natural

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

selection to account for the complexity of life. Careful examination of the evidence for Darwinian theory should be encouraged

Posted by Mark Mahin at 3:01 PM No comments:

Labels: Darwinism, evolution, natural selection

Friday, August 21, 2015

Does Darwinism Plausibly Explain the Origin of Human Intelligence?

Probably the three greatest origin mysteries are the origin of the universe, the origin of life, and the origin of human intelligence. Scientists have no explanation for the first of these mysteries, for the Big Bang is unexplained under current science. Darwinism offers no answer to the second of these mysteries. We cannot at all explain the origin of life through any theory of natural selection, as natural selection requires life to exist before it can begin.

But Darwinists claim to have an explanation for the third of these mysteries, the origin of human intelligence. They claim that human intelligence arose because of natural selection. Natural selection involves traits becoming more common in a species when such traits make members of that species more likely to reproduce, or survive until reproduction. A simple Darwinian account of the origin of human intelligence would be that our ancestors got smarter and smarter because there was a survival value in increased intelligence, and natural selection tends to favor traits that give a survival value.

But there are reasons for doubting the plausibility of such an explanation. One reason is that the human mind seems to include many characteristics that do not make a human more likely to survive until he reproduces. Such traits include spirituality, moral reasoning, introspection, self-awareness, altruism, philosophical ability, aesthetic appreciation, and mathematical reasoning.

Another reason for doubting the plausibility of a Darwinian explanation for human intelligence is one that may be called the "high-hanging fruit" reason. This is the reason that the evolution of intelligence in a species would seem to be a case of nature following a path to reproductive success vastly more difficult than easier, simpler paths to reproductive success, which would be rather like someone plucking a fruit from the upper branches of a very tall tree, rather than plucking a fruit from the lower branches. Imagining such a thing does not seem very plausible.

To clarify what I am talking about, let us consider the options available to evolution after some evolutionary ancestor of man descended from the trees, and began life on the ground. We can imagine a variety of options that evolution might have taken to help guarantee reproductive success. They include some of the following:

Evolve a greater sense of smell. Such an adaption (which we can see in organisms such as dogs and bears) is extremely useful in finding food.
Develop claws. Such an adaption (which we can see in bears) can be a powerful weapon against predators when combined with a powerful

forelimb.
Develop a large thorax with very powerful arms. Such an adaption (which we see in gorillas) can be a powerful defense against predators.
Develop legs longer and faster than human legs. We don't know of any primate that developed such an adaption, but it would have been very useful in evading predators.
Develop digestive enhancements. We can easily imagine some evolution of the digestive system which would have allowed a species to eat a wider variety of foods (including grass), which would have made finding food a much easier task.
Develop a shorter reproductive cycle, with more offspring. This approach to reproductive success would have been rather the opposite approach of developing intelligence. Instead of evolving a larger brain (which limits the number of offspring, and often involved death to the mother in childbirth because of the difficulty of fitting a large head through the birth canal), a species could have evolved in a way that might that might have led to far more child births per mother, with shorter gestation periods.
Develop camouflage. We can easily imagine an adaption that might have made human ancestors less likely to be noticed by predators, perhaps something like a greenish fur.
Develop better vision. Such an adaption (which we see in eagles, who have 20/4 vision much better than ours) would have made it much easier to find food.

These are only some of the possible adaptions that a human ancestor might have taken to increase its reproductive success. All of these adaptions have one thing in common: they all would have been vastly easier for evolution to have achieved than the evolution of intelligence. Darwinism tells us that the more complicated an adaptive trait is, the more mutations it required. Science has absolutely no specific account of the number of mutations needed to develop human intelligence, but we can be quite sure that the number of mutations needed to develop human intelligence must have been many times greater than the number of mutations needed for the evolution of adaptions like those listed above.

All of the items listed above are rather like low-hanging fruit available to evolution. So why did evolution (when dealing with man and his near ancestors) pass over such possibilities, and instead produce human intelligence, a fruit hanging so much vastly higher up on the tree? It's rather like a hungry person climbing 25 meters up a tree to pluck an apple, rather than just plucking an apple hanging 5 feet off the ground.

Why did evolution pluck the high-hanging fruit rather than the low hanging fruit?

Limiting ourselves to Darwinism, we cannot at all answer this question by suggesting some kind of "arrow of progress" in evolution by which it favors grander and grander designs. According to Darwinian accounts, natural selection doesn't care a whit about "progress," but cares about nothing but reproductive success.

Let us imagine that we discovered a planet on which there was some animal species that used laser beams to zap its prey -- laser beams fired from some biological structure of the species. It would be all but impossible to explain such a thing through any account involving natural selection. We could not plausibly explain such a thing merely by saying that such an adaption increased the survival value of the species that had it – because we would still have the question of why such a hard-to-achieve result had been obtained by evolution rather than some other simpler adaption which would have achieved the same degree of survival advantage in a way that would have been so much easier to achieve. Exactly the same problem exists with explaining the origin of human intelligence by using an explanation of natural selection.

What I am suggesting here is that according to Darwinism, the evolution of intelligence is not at all something that we should expect, but is instead some strange fluke. Exactly the same thing has been suggested by some of the leading evolutionary theorists. George Gaylord Simpson wrote an essay called "The Nonprevalance of Humanoids," suggesting that the evolution of beings like us was some rare fluke we should not expect to see repeated in the accessible universe. Ernst Mawr (another leading Darwinist) argued that the appearance of intelligence was a rare fluke, and that it is highly unlikely that alien life has achieved intelligence.

Comments such as these by leading Darwinists strongly suggest that Darwinism does not offer a plausible account of the origin of human intelligence. Generally speaking, you only offer a plausible explanation of something when you offer some explanation under which such a thing is likely.

Consider a trial in which the prosecution is arguing that someone named John killed his wife. Imagine if the prosecution shows that (a) John had a violent temper; (b) John had $500,000 in gambling debts which he owed to a crime syndicate; (c) John had a million dollar life insurance policy on his wife; and (d) John had just become enraged after finding out his wife was committing adultery. This would all add up to a good start in a plausible case for showing John killed his wife. Under such conditions, we might expect that someone like John would have killed his wife. But imagine the prosecution merely suggested that it was some strange fluke, and that John had killed his wife just because he didn't like the clothes she was wearing on the day she was murdered. That would not be a plausible explanation for a murder, because it would not be a set of conditions under which such a murder would be likely.

Similarly, if Darwinists cannot give us a situation under which the evolution of intelligence is likely under Darwinist principles, they have not provided a plausible explanation of the origin of human intelligence. You do not give a plausible explanation of something if you describe it as being a strange rare fluke under your theoretical framework, something we would be unlikely to see again on any of millions of other planets.

This difficulty was recognized by Alfred Russel Wallace, who developed the theory of evolution at the same time as Darwin. Talking about the human brain (which is about three times heavier than a gorilla brain), Wallace wrote the following (quoted in section 5.8 of this interesting work):

A brain one-half larger than that of the gorilla would....fully have sufficed for the limited mental development of the savage; and we must therefore admit that the large brain he actually possesses could never have been solely developed by any of those laws of evolution, whose essence is, that they lead to a degree of organization exactly proportionate to the wants of each species, never beyond those wants...Natural selection could only have endowed savage man with a brain a few degrees superior to that of an ape, whereas he actually possesses one very little inferior to that of a philosopher.

Upon reading this passage, Darwin wrote to Wallace: "I hope you have not murdered too completely your own and my child." Darwin need not have worried about such an objection murdering the whole theory of evolution, but should indeed have wondered whether it threw doubt on the idea that natural selection is the main cause of evolution.

We need to start pondering explanations of the origin of human intelligence which describe a situation under which the appearance of human intelligence is a likely event rather than some incredibly improbable fluke. No theory that describes the origin of human intelligence as some strange improbable fluke can claim to have offered a plausible account of the origin of human intelligence.

Posted by Mark Mahin at 2:55 PM No comments:

Labels: Darwinism, evolution, natural selection, origin of Mind

Sunday, July 26, 2015

We Do Not Know That Evolution Occurs Mainly Because of Natural Selection

The history of science contains many cases of theories that were oversold by eager apostles. One of the main cases today involves the overselling of the theory of natural selection. In this case many of our biologists are representing as "settled science" the idea that natural selection is the main cause for evolution. The evidence for evolution is good, but the evidence is quite weak that natural selection is the main cause of evolution in large organisms.

Let me clarify the difference between evolution and natural selection. Evolution is the idea that over very long periods of time, species very gradually undergo changes, developing novel adaptions to their environment, with such adaptions sometimes becoming sufficient for one species to evolve into a different species. Natural selection is a hypothesis about the cause of evolution. Natural selection says that evolution occurs mainly because organisms that are more fit to survive tend to reproduce more. Darwin introduced both the basic idea of evolution and the theory of natural selection at the same time, in a book entitled *On the Origin of Species by Means of Natural Selection*. But it is quite possible to believe in evolution without believing that natural selection is its main cause.

The modern theory of natural selection is all centered around the idea of random mutations. The idea is that the blueprint of a species (found in its DNA) undergoes random changes called mutations, which might be produced by something like a cosmic ray hitting the DNA stored in a cell, or a random

“copying error” when the DNA is not copied exactly right. In some cases, it is claimed, these random changes result in a change that is actually beneficial. When such a thing happens, it is claimed, natural selection causes the organisms that had such mutations to reproduce more often than some other organisms in that species which did not have such a mutation. It is claimed that this causes the mutation to be inherited more and more often in later organisms belonging to that species. Such a process, it is claimed, it so powerful that it can account for all kinds of astonishing adaptions in organisms.

Now the question is: what evidence is there for this theory that natural selection is the main force behind evolution? Although there is lots of historical evidence for evolution (found in the fossil record), there is no significant historical or fossil evidence that natural selection has been the main cause of evolution in large organisms. Think for a moment of the difficulties of ever getting such evidence. In almost all cases when we have a fossil record of some organism that existed eons ago, we don't have DNA from that organism. Even if we had that DNA (from a few dead organisms), it would still not be enough to figure out the history of DNA changes in a species from long ago, and whether or not natural selection was the cause of evolution in a particular species.

It turns out that getting evidence for natural selection requires an incredibly hard procedure. This procedure has been attempted on some small organisms with very short lifespans (such as bacteria and fruit flies). The procedure might go something like this:

1. You start out with a population of organisms of some type, and you carefully record the DNA of all of those organisms.
2. You track the evolution of these organism over many generations, while applying some factor that causes lots of mutations. The DNA of these organisms must be checked at very many times.
3. You attempt to determine whether useful new adaptions are being evolved, and attempt to determine whether such adaptions (this new functionality of evolutionary novelty) are being produced by natural selection and random mutations.

The experiments that have been done along these lines have produced very modest results. The study here studied 600 generations of fruit flies, finding no change more dramatic than a 20% shorter life cycle.

Another experiment is Richard Lenski's long-term experiment on bacteria, which has tracked more than 60,000 generations of bacteria. The results of this experiment have been modest, with the main result merely being that the bacteria seem to have developed an ability to digest citrate that it did not have before. Documenting such an adaption is “peanuts” compared to demonstrating that a significant and complicated structural innovation (such as the human eyeball or a wing) did occur because of natural selection (something that no one has ever demonstrated).

Even Lenski's meager result is subject to doubt, as a large fraction of scientific experiments are not replicated when another experimenter tries to replicate them (and in the case of Lenski's experiments, it will be decades before we can determine whether someone is able to replicate his results).

There is a simple reason why experiments of such a type can never show that natural selection is the main cause of evolution in large organisms. The shorter the life cycle of an organism, the more likely it might be for it to evolve beneficial changes because of natural selection. Bacteria such as those in Lenski's experiment have a lifespan about 130,000 times shorter than a human lifespan, and can double their population in only about an hour. It is all too possible that natural selection is sufficient to cause useful adaptions in very short-lived organisms such as bacteria, but is not sufficient to cause useful

adaptions in large, long-lived organisms such as animals as large as a dog or larger.

But isn't there some way, in theory, that you could prove natural selection by using large long-lived animals such as mammals? Yes, in theory there is. But it has never been done, and would be a nightmare to do, as it would take ages.

Imagine how the project might be executed. After building some special testing environment (perhaps some special large building), you would start out with a population of some large species with a lifespan of more than decade. You would take samples of the DNA of each organism in such a population. You would then monitor such a population over many generations, frequently taking DNA samples to see how the DNA was changing. Since a generation for such organisms would take at least a year, the project would have to probably last for thousands of years. All in all, it would be a project more difficult than landing men on Mars. No one has ever done such a project, or even one tenth of such a project.

It would seem that for reasons such as these, the theory that natural selection is the main explanation for the evolution of large animals is one that simply is not very susceptible to experimental verification. But what about some other approach? What about some approach in which we get the predictions of the natural selection theory, and then try to verify that such predictions are coming true?

But that doesn't work either. The reason is that the modern theory of natural selection is all centered upon the idea of blind chance. The theory assures us that natural selection will do random stuff we can't predict. So there is not much of a way to match up reality with the predictions of natural selection. For example, natural selection does not give us any predictions about what a particular organism will evolve to in the future. So there is no way to exactly match up predictions and reality when trying to get proof for natural selection.

So from the standpoint of being verified, the theory that natural selection is the main driver of evolution in large animals is on incomparably weaker ground than other scientific theories which do make a host of exact numerical predictions that are repeatedly verified to the letter. Using a theory such as the theory of gravitation, one can make very precise predictions such as the prediction that a particular object released from a particular height will hit the ground 14.5 seconds after it has been dropped. Such predictions have been verified countless times. But the theory of natural selection has no such record of predictive success. Some of the things that are sometimes claimed as "successful predictions" of the theory (such as the discovery of something like DNA) are not actually predictions uniquely predicted by the theory. A nonbeliever in natural selection would have been just as likely to have predicted that something like DNA existed before it was discovered.

Eager to try to prove that natural selection is an important determinant of human traits (or the main determinant), some scientists have resorted to statistical analysis of DNA (the genome). But such studies may not be mathematically sound. In 2009 Phys.org published this article stating the following:

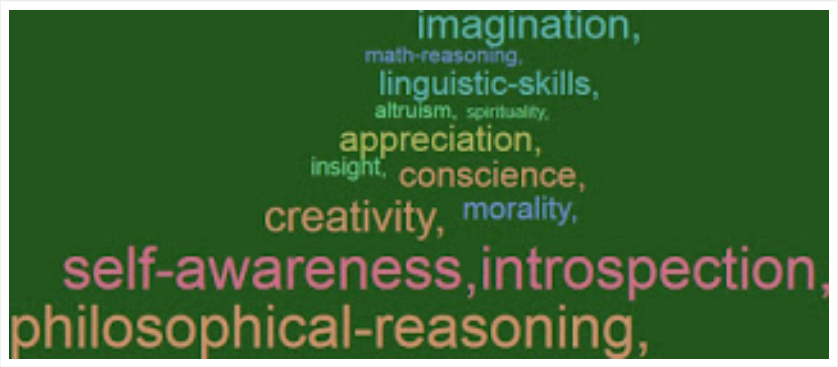
Scientists at Penn State and the National Institute of Genetics in Japan have demonstrated that several statistical methods commonly used by biologists to detect natural selection at the molecular level tend to produce incorrect results. "Our finding means that hundreds of published studies on natural selection may have drawn incorrect conclusions," said Masatoshi Nei, Penn State Evan Pugh Professor of Biology and the team's leader.

Likewise the paper here states, "Many of the statistical methods for detecting natural selection are unreliable."

The study *Genome-Wide Scans for Footprints of Natural Selection* notes, “a puzzlement arises when we inspect how modest is the replication for discovery of different genomic regions between algorithmic approaches or between different studies.”

Given these items, one must wonder whether scientists scanning the genome, eagerly looking for faint traces of natural selection, are much different from UFO enthusiasts scanning photos of Mars and occasionally claiming to have found something important. Given a mountain of data, sufficient time and a huge toolkit of statistical methods to choose from, it is not too unlikely that you may be able to find “faint traces” of exactly whatever it is that you were hoping to find. I may also note that finding some statistical trace of natural selection would not by itself prove that natural selection is the main thing driving evolution in larger organisms such as man. It is entirely possible that natural selection is a relatively minor effect in species with long lifetimes, and the main thing propelling evolution is something else.

There are also very substantial reasons for doubting that natural selection is the main thing that caused evolution in humans. The best reason I know of is the inability of natural selection to explain dozens of human mental faculties and traits that do not seem to be adaptions that contribute to reproductive success. Consider this question: what is it intellectually that makes a human different from a monkey? There are many things: we have good language ability; we're good at math; we have morality; we are spiritual; we have esthetic abilities that allow us to create and appreciate art; we have inner lives and introspection; we can form abstract ideas and ponder philosophical questions; and so forth. But none of these things are biological adaptions that improve an organism's likelihood of surviving until reproduction. So none of these things can be explained by natural selection. It would seem, in fact, that natural selection theory predicts that such things as these should not even exist.



Human traits hard to explain by assuming natural selection

So far from just being a case of natural selection not making predictions that we can verify, the problem seems to be that natural selection theory would seem to make counterfactual predictions about human nature – that you should not have any important characteristics unless they make you more likely to survive until reproduction (in other words, that you should not have most of the things that make you different from a monkey).

The difficulty of using natural selection to explain the origin of man's mental capabilities is compounded by the fact that about 200,000 years ago the population of humanity was believed to be small, as few as 10,000. The fewer organisms there are in a population, the more unlikely that there will be enough mutations for natural selection to produce something useful.

I may point out here that you could not counter these arguments merely by pointing out some evidence that natural selection occurs. Let's consider three different ideas that can be listed in a table.

Hypothesis 1	Natural selection occurs.
Hypothesis 2	Natural selection occurs, and is the main cause of new adaptions or features in small organisms with short lifespans (bacteria, fruit flies, etc.)
Hypothesis 3	Natural selection occurs, and is the main cause of new adaptions or features in large organisms such as humans.

You do not prove Hypothesis 3 by merely proving Hypothesis 1 or Hypothesis 2. Since the reproduction rate of tiny organisms may be thousands or tens of thousands of times greater than the reproduction rate of large organisms, you don't prove Hypothesis 3 by proving Hypothesis 2. So you can't successfully rebut this post by merely citing something that supports Hypothesis 1 or Hypothesis 2.

Given all these problems with the idea of assuming that natural selection is the main cause of evolution in large organisms, why is such an idea being sold as "settled science"? Why are we being dogmatically assured by so many biologists that they understand what caused the appearance of man's higher traits? I think it's a case of premature triumphalism. After first figuring out that evolution is occurring, our biologists should have merely said to themselves: we have completed one lap, but there are still 10,000 laps to go before we understand this. But instead scientists crowned their heads with laurel leaves (and put gold medals around their necks) after completing the first lap – by assuming that the first major book on evolution had also figured out what the cause of it is. It is all too plausible that the actual cause of evolution is some principle or principles far more complex and vastly more deep than the simple idea of natural selection. If we ever understand such a principle or principles, I suspect we will find that it is also the explanation of the origin of life, something entirely unexplained by the theory of natural selection.

It is entirely possible that the main thing driving evolution is some natural mechanism far deeper and more sophisticated than natural selection – some mechanism involving undiscovered laws of nature or undiscovered information processes (or both) that tend to work in a teleological or anti-chaotic manner, causing more and more complex things to emerge from simpler things. Nature could have embedded within it some kind of programming (or something that acts like programming), some wellspring of emergence that acts as an antithesis to the Second Law of Thermodynamics, causing ever-increasing order as time passes. Such a principle might be behind the evolution of man's faculties, the origin of life, and the physical ordering of the universe since the time of the Big Bang.

Postscript: See the link here for a 2-sentence statement signed by hundreds of scientists and PhD's. The statement states exactly the following:

We are skeptical of claims for the ability of random mutation and natural selection to account for the complexity of life. Careful examination of the evidence for Darwinian theory should be encouraged

Posted by Mark Mahin at 12:22 PM No comments:

Labels: Darwinism, evolution, natural selection

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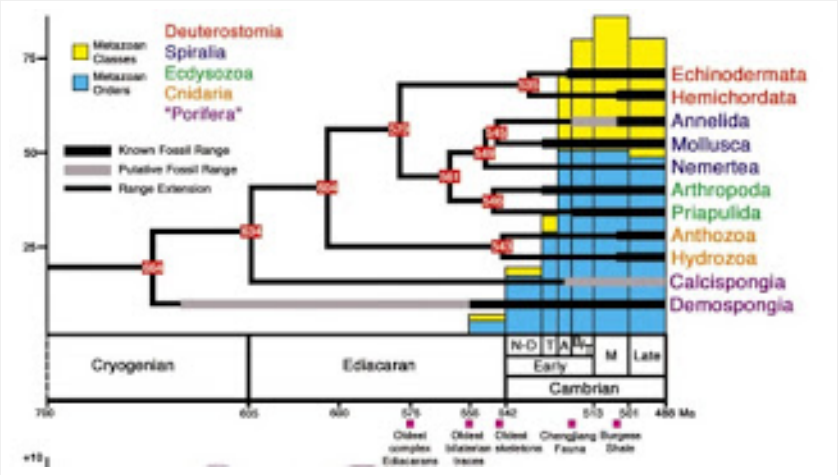
Tuesday, July 14, 2015

Was the Cambrian Explosion Caused by Extraterrestrials?

In his book *Darwin's Doubt*, Stephen C. Meyer calls our attention to an unexplained anomaly in paleontology. When we examine the fossil record, we don't see fossils appearing in larger and larger sizes, at an even rate of progression between 3 billion years ago and 100 million years ago. Instead, we see relatively little fossil evidence of life prior to the Cambrian era about 500 million years ago. But during the Cambrian era there is a sudden surge of fossils in the fossil record. This sudden blossoming of life during the Cambrian era is known as the Cambrian explosion. The Cambrian explosion is illustrated in the diagram below, from a paper suggesting a prosaic explanation for it. The "known fossil range" lines go back no further than the Cambrian era.



Meyer (who has a PhD from the University of Cambridge) argues that this Cambrian explosion is the result of intelligent design at work in the evolution of life. But there is an alternative to assuming a supernatural hand at work in such a thing. Maybe the Cambrian explosion was caused by extraterrestrials.

We can imagine a hypothetical conversation that could have occurred millions of years ago, aboard an alien spaceship that entered into orbit around our planet.

Xynus: So give me the facts. What is the status of life on this planet?
Zeesin: Our underwater robot probes have confirmed that this planet is an evolutionary dud. There's hardly anything here in the way of life. What a waste of time coming here to this crummy little rock! I told you we should have checked out Alpha Centauri instead.

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Xynus: But maybe we can turn this "dud" into a success. What if we were to accelerate the evolution of life on this planet? Maybe we can turn a dull planet into something where intelligence might eventually evolve.
Zeesin: What do you have in mind? Finding some of those dismal organisms in this planet's oceans, and then gene-splicing them to soup up their evolution? That would be a pretty hard chore. You know I don't like to get my four feet wet.
Xynus: No, I have something very different in mind. We can create some species ourselves using our nanotechnology biology lab. We need merely specify some requirements, and the computer will take care of designing the appropriate DNA. We can print out the organisms cell layer by cell layer using our molecular materializer. Then we just dump the newly designed organisms into the oceans of this planet.
Zeesin: Okay, I guess there's nothing much else to do around here.

There are three ages in time when the idea of extraterrestrial intervention might be helpful. The first is the point when the most primitive life developed. Modern science has not yet explained a plausible scenario by which that occurred, partially because of the difficulty of explaining both the origin of a self-replicating molecule and the difficulty of explaining the origin of the genetic code. The second age in time is the Cambrian explosion mentioned here. The third age in time is the time when we saw the emergence of human intelligence. We might call this the "consciousness explosion," when man seemed to gain in a relatively short span of time (geologically speaking) a variety of subtle mental characteristics such as aesthetic abilities, spirituality, math abilities, language abilities, musical abilities, introspection, and moral reasoning. Accounting for this consciousness explosion is perhaps more difficult than accounting for the Cambrian explosion, given that most of these things are not easy to explain through natural selection, as they are mostly not traits that increase an organism's likelihood of surviving until reproduction.

But there is a barrier to anyone suggesting that some design – either extraterrestrial or supernatural – may have played some role in the origin of life or earthly life or human life. Some scientists have declared that any mention of design in discussing such matters is "not part of science" or "unscientific." This thought taboo is indefensible. A few examples show very clearly that there is no truth to the idea that "scientists don't consider the possibility of design" when trying to consider causes.

For example, imagine a strange radio signal is received from deep space. If the signal is sufficiently suspicious, a scientist will indeed consider the hypothesis that design was involved, and that the signal may be a signal from an extraterrestrial civilization. Or imagine that some suspicious looking structure (on an asteroid, moon, or planet) is photographed by a space probe. A scientist will indeed consider the hypothesis that design was involved, and that the structure may have been designed by some extraterrestrial expedition that arrived in our solar system. Or suppose a scientist finds some artificial-looking object buried in a geological bed. A scientist will indeed consider the hypothesis that design was involved, and that the structure may have been designed by some human or some extraterrestrial visitor. Any scientist could advance any of these ideas in a scientific paper without fear of being excluded because he had considered some possibility of design.

The notion, therefore, that considering (or arguing for) a possibility of design in discussing the origins of life on earth is unscientific (or not admissible in a science publication) makes no sense. Such claims need to be translated. When a scientist claims that a hypothesis is "not part of science," what he typically means is that such a hypothesis "is forbidden or should be forbidden to scientists." When he claims that a particular hypothesis is unscientific, what he typically means is that such a

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► January (8)

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► 2018 (93)
► 2017 (92)
► 2016 (92)
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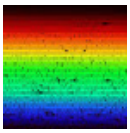
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hypothesis is a taboo that violates the tribal norms of the scientific community. Such claims tell us about sociological and cultural restrictions and prohibitions within the scientific community, but usually don't give us any cogent principle as to how our thought should be limited.

Posted by Mark Mahin at 1:16 PM No comments:

Labels: Cambrian Explosion, evolution, panspermia

Thursday, November 20, 2014

Homosexuality Hard to Explain Using Darwinian Orthodoxy

Under the thinking encouraged by many a modern materialist, almost everything about us can be explained by evolution and our genes. But there are difficulties in such thinking, one of which is properly accounting for the widespread existence of homosexuality.

Darwinism is centered around the idea that evolution slowly increases the prevalence of traits which tend to increase an organism's likelihood to survive until reproduction (and also the likelihood of the organism's reproduction). So suppose there were two genes in different organisms of a species, one which caused very strong sexual interest, and another which caused complete lack of sexual interest. According to conventional evolutionary theory, the first gene would cause more reproduction, which would cause the gene to become more and more common (all other things being equal), as the gene was inherited more and more often; but the second gene would cause less reproduction, which would cause the gene to become less and less common, because the gene would be inherited much less frequently.

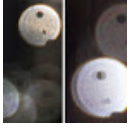
How, then, can we account for homosexuality using such principles? Surveys indicate that between about 2% and 6% of the population are gay or bisexual. Given that very many gay people would never answer "Yes" when asked if they are gay, the actual percentage may be even higher.

Today homosexuality is generally believed to be an inherent tendency, not a choice; so under Darwinian conventions we have little choice but to assume that homosexuality has a strong genetic component. It has been estimated that homosexuals reproduce at only 20 percent of the rate that heterosexuals reproduce. It would seem that a straightforward calculation using Darwinian conventions lead us to the conclusion that homosexuality should have died out long ago. Whatever genetic basis might be behind homosexuality should have become less and less common, because of the vastly lower reproduction rate of homosexuals. It would seem, therefore, that homosexuality shouldn't exist, at least not in its current prevalence of perhaps 5% of the population.

Biologist J.B.S. Haldane imagined a case in which 99.9 percent of the population had one gene, and only .1 percent of the population had a second gene. If there was some reason why the second gene was 1% more likely to be inherited, then within 4000 generations, things would completely switch around so that 99.9 percent of the people would end up with the second gene, and only .1 percent would end up with the first gene. The example illustrates how strongly evolution tends to get rid of genes that are less likely to be passed on to descendants.

So how can we account for homosexuality under conventional Darwinian assumptions? Some theories have been suggested, but they haven't been very convincing. In this article evolutionary biologist David P. Barash discusses some possibilities for explaining this paradox, but he just doesn't seem to be able to get to first base.

Barash first mentions "kin selection" as a possibility, saying of homosexuals "perhaps they are able to help their relatives rear offspring, to the ultimate evolutionary benefit of any homosexuality-promoting genes present in those children." That's very speculative, and Barash gives no evidence to support it, except mentioning some tiny Samoan gay



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- The Gigantic Missing Link of Biological Life

group which he claims “lavish attention upon their nieces and nephews.”

Then Barash mentions a “social prestige” theory, claiming that gay men became priests or shamans, and that “perhaps the additional social prestige conveyed to their heterosexual relatives might give a reproductive boost to those relatives, and thereby to any shared genes carrying a predisposition toward homosexuality.” But Barash admits that this idea is “lacking in empirical support,” which means there is no evidence for it.

Another theory for the survival of homosexuality is that it had something to do with what is called group selection. As Barash puts it, “Although the great majority of biologists maintain that natural selection occurs at the level of individuals and their genes rather than groups, it is at least possible that human beings are an exception; that groups containing homosexuals might have done better than groups composed entirely of straights.” Judging from that wording, it doesn't sound like that theory is on solid ground, since it contradicts an assumption made by the “great majority” of biologists.

Barash also mentions a “balanced polymorphism” explanation, saying “the possibility cannot be excluded.” Again, not a solid speculation, since no evidence is provided. He also mentions the possibility of “sexually antagonistic selection,” but says there is “no evidence for this idea.”

So while Barash mentions quite a few possibilities, he gives the reader no confidence at all that evolutionary biologists have any good explanation for why homosexuality has not died out because of evolutionary factors. Barash has nothing but strained speculations, and the only evidence he claims to have is a thin and dubious claim involving some tiny group in the distant islands of Samoa – a country with a total population of only about 200,000.

It would therefore seem that the large-scale existence of homosexuality is a significant problem for Darwinian orthodoxy. In fact, as I explained in this essay, Darwinian orthodoxy has quite a few difficulties accounting for numerous aspects of humanity, such as our abilities for math, language, philosophy, introspection, and tendencies such as spirituality, aesthetic appreciation, and altruism, most of which don't do much good from a “survival of genes” evolutionary standpoint. It would seem that while Darwinian concepts are a valuable contribution that explain a great deal, Darwinism may be seriously oversold as some kind of “this explains everything” theory to account for human nature.

These are hard to explain using only Darwinism

Could any unorthodox thinking lead us to other possibilities that might account for homosexuality?

I know of one unorthodox hypothesis about the cause of homosexuality. The hypothesis goes like this: (1) some people alive on Earth have had previous earthly lives; (2) a male homosexual is typically someone who was previously reincarnated as a female; (3) that

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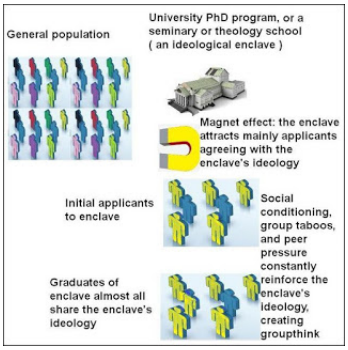
When newly awarded PhD's start writing papers and books and judging truth, they are rather like jurors who have been methodically expos...



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Labels

- 3D printing (1)
- abundance (1)
- acupuncture (1)

person is attracted to males because of a residual attraction to males carried over from a previous life as a female. The only evidence for this hypothesis is the evidence for reincarnation, which may be much stronger than many people think, due to the research of Ian Stevenson at the University of Virginia.

Another unorthodox hypothesis is the hypothesis that a large part of the blueprint or schema for a human being is stored outside of a person's DNA. I explained this idea in my previous post entitled "Half of the Blueprint for You May Be Stored Outside Your Cells," in which I pointed out the curious fact that the species of plant known as rice is believed to have 38,000 genes, but humans (almost infinitely more complicated) are believed to have only 23,000 genes. In that post I summarized this idea as follows:

Genes are a very important determinant of human nature. But as they are merely recipes for making proteins, we cannot at all explain all the exquisite features of human nature by assuming that the secrets of human nature are all stored in merely 23,000 genes. There may well be some completely undiscovered information storehouse that also is crucial in determining human nature – an unknown noncellular "dark genome." When a human body and a full human mind comes into existence, it may require information from cellular genes and this mysterious noncellular"dark genome."

If there is some kind of "dark genome" that might help to explain human nature, homosexuality could be an aspect of that, perhaps some permutation of human nature stored among various other permutations in that "dark genome" (here "dark" simply means currently undiscovered). This "dark genome" or "second genome" might be unrelated to reproduction rates, so within such an information storehouse the continued existence of traits related to homosexuality might be plausible enough.

Another unorthodox idea, which no doubt will infuriate some fundamentalists, is that homosexuality has been deliberately included as part of the human mixture by a higher power, who wants homosexuality to exist so that it can one day be a significant brake on out-of-control overpopulation.

These ideas are admittedly speculative – but no more speculative than the totally speculative musings of Professor Barash, who seemed "lost at sea" when trying to give an orthodox Darwinian explanation for why homosexuality still is widespread.

Postscript: According to the book *Dataclysm: Who We Are* by Christian Rudder, a Google researcher has reported that 5 percent of porn searches are for gay porn, and that such a percentage is consistent from state to state in the US. This data tends to back up both the idea that homosexuality is inherent, rather than something largely chosen (given the local drawbacks of "choosing to be gay" in some US states such as North Dakota and Mississippi); and it also suggests a relatively high gay population (5% rather than just 2%). Such data tends to accentuate the explanatory problem mentioned in this post.

Posted by Mark Mahin at 8:33 AM No comments:

Labels: evolution, genetics, homosexuality, reincarnation

Wednesday, September 3, 2014

Which of These 12 Forces Controls Evolution?

If you listen to a modern molecular biologist, he may tell you with great confidence that he knows what controls evolution. But the issue may not be as cut-and-dried as such a person may think. I can think of at least 12 different forces that may control evolution on our planet. Below is a very balanced list of possibilities, which covers a wide spectrum of alternatives.

Possibility 1: Blind Chance

This is the typical answer given by scientific academia in regard to what controls evolution. The theory is that random events such as cosmic rays or DNA copying

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

mistakes cause chance mutations in the DNA stored in cells of an organism. This creates a variation in characteristics in a species, and those variations that have more survival value end up getting reproduced more, because of natural selection and survival of the fittest.

I do not exclude the possibility, but there are some reasons why it may be problematic as an explanation of what controls evolution. One issue is that mutations are random changes, and most random changes are harmful. Think of DNA as like programming code, and then ask yourself: what is the effect going to be of randomly changing something in a block of programming code? Any programmer will tell you: you'll probably mess things up. So how it is obvious that we should explain something such as the evolution of a highly specialized animal by evoking random mutations?

Another issue is that while blind chance evolution may be a pretty good way of explaining how we got from microbes to mammals, such a concept may be insufficient for explaining how we got microbes in the first place, and how we got from mammals to men. The latter, in particular, requires the appearance of all kinds of advanced human characteristics such as self-consciousness, spirituality, altruism, philosophical abilities, math abilities, and language abilities that may be very hard or impossible to explain by mere blind chance and mutations, for reasons discussed here.

Possibility 2: God

Of course, many believe that God is in control of evolution. One possible issue with this idea is that our universe seems to have many, many planets. Our sun is merely one star among billions in our galaxy, and there are billions of galaxies. There could easily be 1,000,000,000,000,000,000 planets on which life is evolving right now. If one imagines that the creator of the universe is directly involved in the evolution of life on each and every planet in our vast universe, that seems to be assigning a tremendous amount of work for any one being to do at one time. Perhaps too much work.

Possibility 3: Angels

Given the existence of as many as 1,000,000,000,000,000,000 or more planets on which life is evolving right now, it could be that a creator of our universe chose to divide up the job of controlling evolution on planets. Such a creator could have created subordinate spiritual beings to handle some of the work. The best word we have for such a concept is “angels,” although some might prefer some other term to avoid Christian connotations. It could be that some local spiritual beings are in control of our evolution, while the creator of the universe busies himself with other more pressing matters. Such angels might or might not look anything like traditional depictions of angels.

Possibility 4: Extraterrestrials

The idea that extraterrestrials from another planet have had a hand in earthly evolution is one that has been around for a long time. One flavor of it is the theory of panspermia. There are quite a few ancient astronaut enthusiasts who propose various theories of how Earth's history has been affected by alien intervention. One possible line of evidence in support of this theory are the many UFO sightings. Some UFO enthusiasts even have elaborate theories of how UFOs are abducting humans and gathering genetic samples from them, for the sake of creating a hybrid race of extraterrestrials and humans.

Other people attempt to explain the origin of earthly life by imagining extraterrestrial intervention billions of years ago, although that just pushes the problem farther away in time and space, leaving the problem of how life originated on the home planet of those extraterrestrials.

Possibility 5: Future earth inhabitants

This possibility is not quite as outrageous as it may seem. Researchers such as Daryl Bem of Cornell University have gathered evidence for precognition, an anomalous human ability to gain knowledge of the future. Some think that such evidence implies a doctrine

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

of retrocausation, the idea that someone in the future can influence something that happened in the past (although there is debate about whether one implies the other). If the idea of retrocausation is valid, it could be that the current evolution of our planet is being controlled by people in the future, who may be taking care to make sure that our evolution is not incompatible with their eventual existence. In fact, Scientific American just published an article with some weird quantum goobledygook that may mean the door is open to such a possibility.

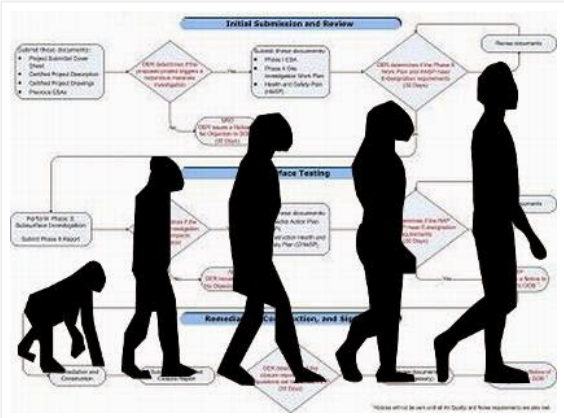
Possibility 6: Elevated afterlife spirits

Again I may say: this possibility is not quite as outrageous as it may seem. Near-death experiences and similar phenomena provide a possible evidential foundation for believing in an afterlife. Sometimes people who claim to be knowledgeable about the topic claim that in an afterlife there are various levels of existence or planes of existence, and that if you progress to a high enough spiritual level you are given the responsibility of controlling evolution on distant planets. But if elevated spiritual beings in an afterlife might control evolution on other planets, they might also control evolution on our own planet.

Of course, some would be depressed by the idea that our evolution might be controlled by our departed ancestors, but the idea is not more depressing than the idea that blind chance controls our evolution.

Possibility 7: Cosmic programming

On other posts on this web site (here and here) I have discussed the theory of a programmed material universe. The idea is that the universe has a kind of information infrastructure that drives cosmic evolution, propelling the universe on to ever higher heights of glory. Such an information infrastructure might include programming, a cosmic computation facility, and a cosmic database facility. Under such a theory, the universe has been programmed for success from the very beginning. Given no special attention, a particular planet might achieve astonishing feats of evolution, not by blind chance, but because the universe is programmed for such successes. Under such a theory the universe reaches levels of evolutionary success rather like a jet plane on autopilot might reach different destinations. It could be that evolution succeeds on planet after planet because the whole universe is in effect "on autopilot." The next phase in human evolution may be something written in the details of the universe's software.



Does cosmic software control evolution?

Possibility 8: Puppet Masters in a Fourth Dimension

Imagine if there were beings in a world of only two dimensions: height and width. They would be like little photo cutouts moving around on a flat puzzle board. A person in a 3-dimensional world could move his hand down and change things in that 2D world, perhaps without any of those 2D beings noticing the intervention. Similarly, there could be beings in a fourth dimension who overlook our 3D world, intervening without us noticing. Such beings may be the puppet masters in control of evolution.

Possibility 9: Ourselves

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

Perhaps to find out who controls evolution, we need merely look in the mirror. It could be that biological evolution has been overshadowed by cultural evolution and technological evolution, which we ourselves control. So maybe we are the masters of our own fate.

Possibility 10: Cycles of evolution

Some historians such as Oswald Spengler have adopted cyclical theories of history. It could be that evolution works in cycles. Perhaps over and over again the same thing happens: life arises to ever greater heights, reaching a state of great intelligence, which leads to great power of destructiveness. Such technological power may lead to the destruction of the intelligent life form in a horrifying apocalypse. Then millions of years later life may again begin to move toward intelligence, only to destroy itself again after reaching great technological power. Such a cycle may have played out several times before, or this may be the first iteration in the cycle. We may be mere pawns in this sad cycle.

Possibility 11: Physical predestination

It could be that the end result of evolution is really determined by some blind deterministic factors which lock our planet into some destiny we cannot change. Evolution may be controlled by some inscrutable force of fate that we have no power to change. For further information please view Verdi's opera *La Forza del Destino*.

Possibility 12: Morphic gravitation

As the last possibility, I will mention an exotic possibility that is fascinating to consider. Let us imagine that for many biological species there is some external form or blueprint or schema that represents a more developed or evolved version of that species. Such a form or blueprint or schema may be called a morphic prototype, and it may exist as information rather than a material model. It could be that a species somehow tends to be very gradually "pulled" towards such a morphic prototype, through a slow process we can call morphic gravitation. We can imagine this process as being a tiny bit like one of those movie morphs, but instead of the morph occurring in a few seconds it might take place over many, many generations. So imagine a morphic prototype of the human species that is more evolved than our current species. Perhaps that morphic prototype depicts humans with larger brains. It might be that gradually our species is being pulled towards that prototype, which results in humans gradually gaining larger and larger brains. Such morphic prototypes might somehow have arisen naturally, or they might be part of some grand deliberate scheme for driving evolution.

Conclusion

I conclude that we simply don't know what force controls evolution. There are too many possibilities for us to have any certainty about the matter.

Posted by Mark Mahin at 9:30 AM No comments:

Labels: evolution, morphic gravitation, programmed material universe

Saturday, January 18, 2014

Why We Shouldn't Exist: A Table of 18 Anthropic Requirements

The Standard Model is regarded as a highly "unnatural" theory. Aside from having a large number of different particles and forces, many of which seem surplus to requirement, it is also very precariously balanced. If you change any of the 20+ numbers that have to be put into the theory even a little, you

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

rapidly find yourself living in a universe without atoms. This spooky fine-tuning worries many physicists, leaving the universe looking as though it has been set up in just the right way for life to exist.
Harry Cliff, Particle Physicist, in a Scientific American article

If you have not read much on the topic of the anthropic principle and the issue of possible fine-tuning in the universe, it may be hard to follow the topic. Discussions typically involves subatomic physics, cosmology, biology, evolution and some other subjects that don't exactly make light reading. I think that the topic will be easier to understand if we condense it into one simple table that summarizes the most relevant facts. I have created such a table, which appears below.

The left column of the table lists various items that appear in nature. The right column lists requirements of those items. The table is in chronological order. It starts out with requirements that must be met in the very beginning, near the time of the Big Bang, if the universe is ever going to end up with people like us, inhabitants of a technical civilization living near a sunlike star. Towards the end of the table are items that appeared billions of years later in time. The final item in the table is "Civilizations near sunlike stars." It is interesting that for the last item to come into existence, all of the previous items in the list must previously come into existence. I have added color coding which makes the various interlinked dependencies much easier to follow.

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

Item	Requirements (Direct or Indirect)
Higgs field	Fine-tuning to 15 decimal places
Up quark, down quark, electrons	Currently unexplained matter/antimatter asymmetry, Higgs field
protons, neutrons	up quark, down quark
hydrogen atoms	protons, electrons, electromagnetic force
Galaxies	Fine-tuning of expansion rate, density perturbations, dark energy, dark matter, photon/baryon ratio, gravitation
carbon atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing carbon in stars
Oxygen atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing oxygen in stars, weak force
Heavier atoms (with more than about 25 protons)	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong force, weak nuclear force and neutrinos causing supernovae
Sunlike stars	Galaxies, fine-tuning of (1) gravitation (2) electron mass (3) Planck's constant (4) speed of light
water	Oxygen atoms, hydrogen atoms
Stable planets	Gravitation, equality of proton charge and electron charge to many decimal places (for planet to hold together)
Nucleotides	oxygen atoms, carbon atoms, molecular bonding requirements
Genetic code	Huge enigmatic requirement -- "programming code from chemicals"
RNA	Nucleotides, Genetic code, water
DNA	RNA, nucleotides, Genetic code, water
Proteins, cells	DNA, RNA, Genetic code, water
Photosynthesis	Exotic quantum effects
Civilizations near sunlike stars	Heavier atoms, sunlike stars, stable planets, proteins, cells, photosynthesis, important unknown other requirements allowing Mind to arise from matter

Click to Expand

I will now explain why each item has the requirements I have listed.

Row 1 (Higgs field): The Higgs field (related to the Higgs boson) is said to give mass to other particles. Scientists are puzzled by why the Higgs field has the strength it has, and they say that it seems to require fine-tuning to 15 decimal places. This is a problem called the hierarchy problem or the naturalness problem. It is discussed in this scientific paper entitled *The Higgs: so simple yet so unnatural*. As a Daily Galaxy article put it, "Using theory as it currently stands, the mass of the Higgs boson can only be explained as the result of a random fine-tuning of the physical constants of the universe at a level of accuracy of one in one quadrillion."

Row 2 (up quarks and down quarks, electrons): The particles in the nuclei of atoms (protons and neutrons) are made up of smaller particles called up quarks and down quarks. A requirement of the large-scale existence of up quarks and down quarks (and also electrons) is what scientists call matter/antimatter asymmetry (a situation where matter is vastly more abundant than antimatter). This is a puzzle to

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

scientists, because the standard model of physics seems to predict that matter and antimatter should have existed in equal amounts at the time of the Big Bang, which would have caused both types of particles to collide with each other and convert into energy, leaving almost nothing but energy in the universe. A requirement for electrons is the Higgs field, and on this page a physicist says that the electron would not have mass without the Higgs field.

Row 3 (protons, neutrons): The simple requirement is that there be up quarks and down quarks, discussed in the previous paragraph.

Row 4 (hydrogen atoms): The requirement for a hydrogen atom is that you have one proton and one electron, and also the electromagnetic force, the force of attraction between a proton and an electron. Without that force, electrons would not have any tendency to orbit a nucleus.

Row 5 (galaxies): Galaxies are huge collections of stars. There are many requirements for the formation of galaxies after the Big Bang. The universe had to begin with a fine-tuned expansion rate, as a slighter higher rate would have caused an expansion too fast for galaxies to form, and a slightly slower rate would have caused all matter to collapse into superdense black holes. Scientists also say that numerous other things had to be just right (the other items listed in this row). One requirement is primordial density perturbations greater than .000001 and less than .0001, as explained here. One particularly severe requirement seems to involve dark energy, which is regarded pretty much the same as the cosmological constant. Cosmologists conclude that the level of dark energy seems to have been fine-tuned to something like 1 part in 10^{60} or one part in 10^{120}. The issue, called the vacuum catastrophe, has been fretted over by many physicists. This paper refers to the "tremendous, unsolved naturalness problem" posed by the cosmological constant.

Row 6 (carbon atoms): This row refers to the abundant existence of carbon atoms, something which ends up having lots of requirements. Besides the previously mentioned requirements for the hydrogen atom (protons, electrons, and the electromagnetic force), there are the additional requirements of the neutron and the strong nuclear force (the two of them allow you to have a carbon nucleus that holds together, despite the mutual repulsion between the protons). There is also the requirement that you have a law of nature called the Pauli Exclusion Principle, something that is quite necessary for both solid matter and complex carbon bonds. Then there is an additional requirement for something called nuclear resonances, which assures that carbon is produced in abundant quantities by stars through a process called the triple alpha process. Without this additional requirement, there would not be enough carbon (which wasn't produced in the Big

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

Bang). This point has been widely discussed by scientists such as Hoyle, and in this scientific paper stating that a 0.4% change in one parameter would have left us without a universe abundant in both carbon and oxygen. An additional requirement that I had no space to list in my table is the requirement that the neutron mass be higher than the proton mass.

Row 7 (oxygen atoms): Oxygen atoms have all the same requirements of carbon atoms, including the same special requirement involving nuclear resonances, necessary for oxygen to be produced by stars in abundant amounts. The scientific paper here argues that there would not be much oxygen without the weak nuclear force, so I have also listed that as a requirement.

Row 8 (Heavier atoms): By heavier atoms I mean all atoms than have more than about 25 protons (which includes copper, lead, silver, gold, zinc, tin, and probably also iron). These types of atoms have most of the same requirements of carbon atoms and oxygen atoms, except that to have these atoms in abundance you don't need nuclear resonances but instead the stellar explosions called supernovae explosions (explosions of stars that produce heavy elements such as lead and iron). These supernovae explosions require a tiny particle called the neutrino and a force called the weak nuclear force.

Row 9 (Sunlike stars): I may define sunlike stars as those that are white, yellow, or orange (or some combination of those colors). Sunlike stars require galaxies (since if galaxies had not formed, there would be no stars). Sunlike stars also require a very delicate fine-tuning of some of the most fundamental constants of nature. The physicist Paul Davies says on page 73 of *The Accidental Universe*: "If gravity were *very* slightly weaker, or electromagnetism *very* slightly stronger (or the electron slightly less massive relative to the proton), all stars would be red dwarfs. A correspondingly tiny change the other way, and they would all be blue giants." Blue giants are too-short lived for life to evolve near them, and red dwarf stars are not believed to be as favorable for life's evolution as sunlike stars.

Row 10 (water): Water requires oxygen atoms and hydrogen atoms, as we can tell from its formula H_2O. Because of its remarkable features that make it unique among liquids, there are probably additional requirements for water, but I haven't listed them.

Row 11 (stable planets): One requirement for stable planets is gravitation, the force that holds planets and stars together. But there is another very interesting requirement: that the electric charge of the proton exactly match the electric charge of the electron, to many decimal places. Electromagnetism (the

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

fundamental force involving electric charges) is roughly 10^{36} times stronger than gravitation, the weakest of the fundamental forces by far. Consequently a very slight mismatch between the charge of the electron and the proton would cause electromagnetism (roughly a trillion trillion trillion times stronger than gravitation) to completely overwhelm the gravity holding the planet together. In his book The Symbiotic Universe, astronomer George Greenstein (a professor emeritus at Amherst College) says this about the equality of the proton and electron charges: "Relatively small things like stones, people, and the like would fly apart if the two charges differed by as little as one part in 100 billion. Large structures like the Earth and the Sun require for their existence a yet more perfect balance of one part in a billion billion." In fact, experiments do indicate that the charge of the proton and the electron match to eighteen decimal places.

RATIO OF PROTON MASS TO ELECTRON MASS:
1836.152672
RATIO OF PROTON CHARGE TO ELECTRON CHARGE:
1.000000000000000

A curious coincidence

Row 12 (nucleotides): Nucleotides are molecules that are the building blocks of RNA and DNA, molecules essential for life. Nucleotides require three types of atoms mentioned above (carbon, oxygen, and hydrogen atoms), as well as phosphorus atoms. They also require physics to be arranged in a way that allows for atoms to combine to make molecules consisting of multiple atoms.

Row 13 (genetic code): The genetic code is a semantic framework used by DNA and RNA, one in which particular combination of nucleotides stand for particular amino acids. The genetic code could roughly be called the software used by DNA and RNA. The origin of this code is one of science's great mysteries. We do not know how this code (required for all biological evolution) appeared from mere chemicals. This is the “code from chemicals” problem described in this blog post.

Row 14 (RNA): RNA is one of the two main molecules used by all living things, and it is believed to have preceded the more well-known and more complicated molecule DNA. It requires nucleotides (from which RNA is built), as well as the genetic code and water (as a substrate).

Row 15 (DNA): DNA requires nucleotides (from which it is built), as well as the genetic code and water. I also list RNA as a requirement since it is believed that RNA was a necessary

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

predecessor of DNA.

Row 16 (Proteins, cells): Proteins are made by DNA and RNA using the genetic code. Requirements include water and amino acids (which I didn't list in the table for space reasons).

Row 17 (Photosynthesis): Photosynthesis is the process by which plants convert sunlight to chemical energy. Recent studies suggest that photosynthesis uses exotic quantum effects.

Row 18 (Civilizations near sunlike stars): Now we come to the last and most important row, which mentions civilizations such as our civilization. There are many requirements for such a civilization. All of the items on the 17 previous rows on the table are indirect or direct requirements of civilizations near sunlike stars. The well-understood direct requirements of such civilizations are heavier atoms (needed so that the civilization can have the metals needed for technology), sunlike stars, stable planets, proteins, cells, and photosynthesis (the last one being necessary even if the beings in a civilization ate nothing but meat, because they would still rely on a food chain that would require photosynthesis).

There is also a poorly understood requirement that does not occur previously on the list – the requirement that somehow unconscious matter can produce Mind of the type that humans have. That is a huge additional requirement. It may require additional laws of nature, or perhaps exotic features of quantum mechanics, as Penrose and Hameoff have suggested. Penrose and Hameroff say here that their "orchestrated objective reduction" theory "suggests that there is a connection between the brain's biomolecular processes and the basic structure of the universe," and yesterday's news reported a finding that supports such a theory. The matter is still undecided, but we do seem to have a huge additional requirement from nature in order to go from mere cellular life to conscious life.

The table I have created illustrates the great number of intertwining requirements needed for the universe to be consistent with the eventual appearance of civilizations such as ours. A huge amount of fine-tuning is required to meet these requirements, most notably in rows 1, 5, 9, and 11, each of which require "1 in a trillion" type coincidences with a very low likelihood of randomly occurring, We also have the very mysterious requirements of rows 13 and row 18, both of which almost seem to require "blood from stone" type of requirements (row 13 involving the origin of the genetic code from chemicals, and row 18 involving the origin of human-like consciousness from mere matter).

The severe improbability of accidentally meeting all these requirements by chance is the reason I have entitled this blog post "Why We Shouldn't Exist: A Table of 18 Anthropic

Requirements." We can say that we shouldn't exist, in the sense that our existence seems to require an almost miraculous conspiracy of conveniences, coincidences and fine-tuning within nature. As Stephen Hawking and Leonard Mlodinow said in their book *The Grand Design* (page 161), "The laws of nature form a system that is extremely fine-tuned, and very little in physical law can be altered without destroying the possibility of the development of life as we know it."

Postscript (2/14/14): The table of anthropic requirements above is not at all a complete list of all of the requirements for creatures like us to exist. For example, I didn't list a major additional requirement for atoms: a dependency on Heisenberg's Uncertainty Principle. As discussed here, were it not for this law of nature, electrons would fall into the nucleus of an atom, preventing any type of atom from existing.

Posted by Mark Mahin at 7:07 AM 1 comment:

Labels: anthropic principle, Big Bang, cosmic fine tuning, cosmology, evolution, galaxies, galaxy formation, particle physics, philosophy

Friday, January 3, 2014

The Origin of Life: Programmatically Predestined?

Let us now look at one of the great mysteries of the universe, the mystery of the origin of life, something that took place more than three billion years ago.

Some readers may be thinking along these lines: *That's not such a mystery. Given a primordial soup and millions of years of time, there developed some self-replicating molecule. Once you had that, the development of everything else was just a case of things evolving from the simple to the more complex.*

But such a glib explanation glosses over the great difficulties involved in explaining the origin of life on the early Earth. The fact is that there are huge difficulties in explaining how life began on our planet billions of years ago. In recent decades scientists have made relatively little progress in solving this problem.

Consider the progress of astronomy during the past 50 years. Since the year 1963 we have seen the discovery of the Big Bang, the discovery that the expansion of the universe is accelerating, and the discovery of more than 1000 extrasolar planets. But without doing a Google search, can you name one bit of progress that has been made in the past 50 years regarding the origin of life? You probably can't. When most of us think of scientific work on the origin of life, we think back to the Miller experiments involving amino acids, but they were done in the 1950's.

We can divide up the problem of the origin of life into three different problems: a necessary components problem, a combinatorial problem, and a computation problem.

The Necessary Components Problem

The basic units of life (below the cellular level) are things such as RNA, DNA, and proteins. Proteins are made of building blocks called amino acids. Some proteins are extremely complicated molecules built from very many amino acids. It was calculated long ago that the chance of some of these proteins forming from random combinations of amino acids is incredibly low, even given billions of years. But that's not necessarily a problem, because proteins are formed using the

instructions in DNA. A DNA molecule is like a library of recipe books, with each of the recipes being a recipe for making a particular type of protein.

So if there is a mechanism for producing DNA from a chance combination of chemicals, we might have a way of explaining how all those complicated proteins came into existence. Unfortunately it seems DNA molecules appear to be way too complicated to have arisen from a chance combination of their constituent elements of nucleotides (which consist of sugars, phosphates, and nitrogenous bases), without assistance from something more complicated than nucleotides.

So the current leading hypothesis is that the first self-replicating molecule was not DNA but something simpler, presumably some version of RNA. This idea is called the RNA World hypothesis. The idea is that first there was RNA, and that DNA evolved later. However, the RNA World hypothesis is on shaky ground.

One problem is the difficulty of explaining the origin of all the necessary building blocks. The table below shows the various types of building blocks. As indicated below, there are reasons for doubting that the ribose sugars, purines, and nucleotides would have existed in sufficient quantity for DNA or RNA to originate.

	Components	
RNA, DNA	Ribose sugars	Harvard science web site: "In experiments ribose could not be made at the necessary quantities that would explain its abundance on early Earth because it was highly unstable." Wikipedia article: some scientists have concluded that "the backbone of the first genetic material could not have contained ribose or other sugars because of their instability."
	Phosphates	
	Pyrimidines (type of nitrogenous base)	2009 paper (Powner et. al) suggests possible path for abiotic origin.
	Purines (type of nitrogenous base)	More complex than pyrimidines. According to this paper, hard to explain abiotic origin, in a way compatible with formation of ribose sugars.
	Nucleosides (combination of ribose sugar and pyrimidines or purines) and nucleotides (a nucleoside plus a phosphate)	Wikipedia article: “No known chemical pathways for the abiogenic synthesis of nucleotides from pyrimidine nucleobases cytosine and uracil under prebiotic conditions."
Proteins	Amino Acids	Found in a meteorite. Miller-Urey experiment produced amino acids from gases and continuous electricity.

The Combinatorial Problem

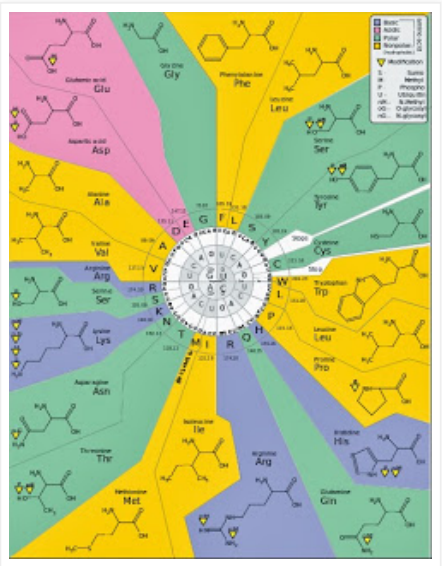
The combinatorial problem is the problem of getting anything like RNA or DNA to appear from the building blocks listed above. This scientific paper by Joyce and Orgel refers to the difficulty of joining together nucleosides (a combination of ribose sugar and pyrimidines or purines) and nucleotides (a nucleoside plus a phosphate). The wikipedia article on the RNA World hypothesis notes that "Joyce and Orgel further argued that nucleotides cannot link unless there is some activation of the phosphate group, whereas the only effective activating groups for this are 'totally implausible in any prebiotic scenario', particularly adenosine triphosphate."

Well-known scientist Freeman Dyson has stated, "The results of thirty years of intensive chemical experimentation has shown that prebiotic synthesis of amino acids is easy to simulate in a reducing environment, but prebiotic synthesis of nucleotides is difficult in all environments...If it happened, it happened by some process that none of our chemists have been clever enough to reproduce."

RNA is made of nucleotides, which are made of ribose sugar, phosphates, pyrimidines, and purines. Scientists have not been able to synthesize RNA through a simulation of the early earth, and in such simulations have not been able to make the simpler nucleotides either. As discussed in the table above, there are difficulties in assuming the availability of even some of the building blocks of the building blocks of RNA.

The Computational Problem

Perhaps the biggest problem involving the origin of life is the problem of accounting for the origin of the genetic code. The genetic code is a symbolic representation system used by all earthly life. It has been called a kind of miniature programming language.



The Genetic Code

It is fairly easy to explain the basics of how the code works. In the spiral staircase structure of the DNA molecule, the "steps" of the staircase are chemicals called nitrogenous bases: either purines (adenine or guanine) or pyrimidines (cytosine or uracil). Various combinations of three of these chemicals stand for different amino acids (the building blocks of proteins). For example, if there are three consecutive "steps" in the spiral staircase, and the first is cytosine, the second adenine, and the third guanine, that stands for the amino acid glutamine. There are 63 other cases where a sequence of three nitrogenous bases stands for a particular amino acid. (In the diagram above, the chemicals around the four edges of the square are the amino acids.)

Imagine if you liked to write down recipes, but you needed to write down many of

them on a single piece of paper. You might invent a little "recipe language" in which MK1 stands for a half a cup of milk, MK2 stands for a full cup of milk, FL1 stands for a half a cup of flour, and so forth, with a total of 64 different three-character symbols (and some other characters standing for "end of recipe"). You might then write out recipes very concisely using this little language. That's quite similar to what the genetic code does, except the recipes are stored in the DNA molecule, and the recipes are instructions for making proteins from the building blocks of amino acids.

The big question is: how did this genetic code ever originate? It's hard to imagine it arising through anything like Darwinian evolution, as the genetic code seems to be required from the very beginning of biological evolution.

The genetic code can be considered an example of *code*, the term software developers use for the symbolic instructions they create. The baffling question is: how did nature go from chemicals to code? Code seems like something fundamentally different from chemicals, and the two seem as unrelated as an apple is to a bicycle.

The issue was highlighted by a paper by biologists J.T. Trevors and D.L. Abel:

"Peer-reviewed life-origin literature presupposes that, given enough time, genetic instructions arose via natural events. Thus far, no paper has provided a plausible mechanism for natural-process algorithm-writing...There is an immense gap from prebiotic chemistry and the lifeless Earth to a complex DNA instruction set, code encryption into codonic sequences, and decryption (translation) into amino acid sequences...How did inanimate nature write
(1) the conceptual instructions needed to organize metabolism?
(2) a language/operating system needed to symbolically represent, record and replicate those instructions?
(3) a bijective coding scheme (a one-to-one correspondence of symbol meaning) with planned redundancy so as to reduce noise pollution between triplet codon "block code" symbols ("bytes") and amino acid symbols?
We could even add a fourth question. How did inanimate nature design and engineer
(4) a cell [Turing machine? (Turing, 1936)] capable of implementing those coded instructions?" -- Trevors and Abel

In this article the widely read physics professor Paul Davies has discussed other difficulties in the "code from chemicals" scenario, the assumption that the genetic code arose from some kind of chemical evolution:

"The language of genes is digital, consisting of discrete bits, cast in the language of a four-letter alphabet. By contrast, chemical processes are continuous. Continuous variables can also process information – so-called analogue computers work that way – but less reliably than digital. Whatever chemical system spawned life, it had to feature a transition from analogue to digital. The way life manages information involves a logical structure that differs fundamentally from mere complex chemistry. Therefore chemistry alone will not explain life's origin, any more than a study of silicon, copper and plastic will explain how a computer can execute a program." -- Davies

This problem of the origin of the genetic code recently got even more difficult to explain, because scientists recently announced the discovery of a *second* genetic

code buried in DNA. Apparently many of the triple sequences have a double-meaning. Explaining one genetic code was a nightmare -- how can we explain two of them?

A New Approach to the Origin of Life

We might get around these difficulties by imagining that the origin of life on Earth required external intervention by a divine agent or perhaps extraterrestrials. But that would raise the question: why should our ordinary little rock have deserved such a special blessing? After all, modern astronomy tells us that planets are as common as apples in an apple orchard.

A more intellectually attractive idea is the daring concept that the origin of life was programmatically predestined. We can boldly postulate that long, long before there arose the programming in the genetic code, there was a more general programming woven into the fabric of the universe, a programming that drives the evolution of the universe, causing the frequent occurrence of things that might otherwise have very little or no chance of occurring. Under such a scenario, we can think that life is appearing throughout the universe, because that is the way the universe is programmed to behave. Under such a concept, we no longer have to imagine the origin of the genetic code by supposing a farfetched case of "code from chemicals." We can instead plausibly imagine the origin of the genetic code as a case of "code from code" – the genetic code being a product of a more general cosmic software that is influencing cosmic destiny, propelling the universe forward towards desirable outcomes.

There are actually many reasons for adopting such a theory, and most of them come not from the world of biology, but from the worlds of physics and cosmology. I will be presenting some of these reasons in a lengthy blog post I will post on this blog on Sunday, January 5th.

Posted by Mark Mahin at 1:02 PM No comments:

Labels: cosmic destiny, evolution, origin of life

Saturday, December 14, 2013

The Mathematical Basis for Suspecting Alien Intervention in Earthly Evolution

The History Channel has a regular television series called *Ancient Aliens* that is devoted to advancing the idea that extraterrestrials may have intervened in human history. This television show is often guilty of laughable leaps of logic. For example, it might show a strange face on an ancient statue, and then show a modern person saying that a face so strange-looking is probably a depiction of an alien. That may seem like good reasoning until you remember that humans have a little thing called imagination, which is a much simpler explanation for a strange-looking ancient statue.

But even though *Ancient Aliens* won't win any logic prizes, there is actually a strong theoretical basis for thinking that aliens may have intervened in earthly evolution. The rationale is not based on direct evidence of such an intervention. It is based instead on probability considerations we can make after analyzing a variety of scenarios relating to the likelihood of intelligent life evolving on a small planet in the habitable zone of a star.

Your basic alien panspermia event

Let's crunch some numbers to throw some light on the issue. Before doing that, I will declare a general intellectual principle worth following: what I may call the *principle of improbability minimization*. This is the principle that given two explanations, one of which requires us to believe in something with a particular likelihood, and the other requiring a belief in something much more improbable, we should generally prefer the explanation that requires us to believe in the less unlikely occurrence (the event that is not such a huge "long shot"). For example, given the choice between an explanation that requires us to believe in no long shot more unlikely than a 1 in 100 long shot and some other explanation that requires us to believe in a 1 in 1,000,000 long shot, we should minimize the improbability by preferring the explanation that only requires belief in a 1 in 100 long shot.

For example, you notice your lottery playing friend has some additional cash, and you can explain it either by assuming that he won the 3-digit "Daily Numbers" lottery that he regularly plays (with a chance of 1 in 999 of winning), or you can explain it by assuming that he won the Megabucks lottery he also often plays (with a 1 in 1,000,000 chance of winning). Following the principle of improbability minimization, you prefer the first of these two explanations.

Now let's look at different scenarios relating to the likelihood of intelligent life evolving on a small planet like ours, in the habitable zone of a star (the "Goldilocks zone" that is neither too hot nor too cold). The most optimistic possibility is what we can call the "sure thing" hypothesis, which is the assumption that intelligent life will almost always appear on any small planet in a star's habitable zone. If this assumption is correct, then we have absolutely no need to assume that extraterrestrials interfered with evolution on our planet, because such an intervention would have been unnecessary.

But we are far from understanding how the amazing DNA molecule and the language-like genetic code appeared billions of years ago. We also don't understand how natural selection could have produced all the higher human faculties such as inner lives and self-consciousness, as I discuss in this blog post. So it is entirely possible that the probability of intelligent life evolving on a small planet in a habitable zone of a star is very low – perhaps 1 in 1000 or 1 in 100,000 or perhaps as low as 1 in 1,000,000,000,000.

It is under cases like these that the hypothesis of extraterrestrial intervention in earthly evolution becomes very useful. It helps very much in the intellectually desirable goal of improbability minimization. Under some cases, rather than having to believe in a very unlikely event with a probability such as 1 in a 1,000,000, we can believe in a much more probable event with a likelihood such as 1 in 10,000.

Let me give a specific example of what I mean. Let us gloomily suppose that the probability of intelligent life independently evolving on a small planet in the habitable zone is 1 in 1,000,000,000. The number of small

planets in the habitable zones of stars in our galaxy is perhaps 10,000,000,000. Under this scenario we would expect that intelligent life would independently evolve on 10 planets in the galaxy. If we don't believe that extraterrestrials interfered in earthly evolution, we have to believe (under this scenario) that our planet lucked out with an event that had a likelihood of only 1 in 1,000,000,000. But imagine we suppose that civilizations on these 10 planets with intelligent life were able to achieve interstellar travel, and that such civilizations (or other civilizations that they helped to make possible) were able to intervene in the evolution of an average of 100 planets, helping intelligent life to evolve on such planets. Then we have a much higher total of planets on which intelligent life appears. In that case the long odds become 100 times shorter. Instead of having to believe in an extremely unlikely 1 in 1,000,000,000 long shot that blessed our planet, we only have to believe in a much less unlikely 1 in 10,000,000 long shot. We have thereby achieved our goal of improbability minimization, and we have made our end assumption much more credible.

The table below shows a range of scenarios concerning the evolution of intelligent life in the galaxy, with each row making a different assumption about how likely it is for intelligent life to independently appear.

	A	B	C	D	E
1	Chance of Intelligent Life Evolving Per Small Planet in Habitable Zone	Number of Small Planets in Our Galaxy Inside Habitable Zones of Their Stars	Number of Planets in Galaxy Originally Evolving Intelligent Life	Probability of Intelligent Life Evolving on Earth Without Alien Help	Probability of Intelligent Life Evolving on Earth With or Without Alien Help
2	0.0000000001	10,000,000,000	1	0.0000000001	0.00000001
3	0.000000001	10,000,000,000	10	0.000000001	0.0000001
4	0.00000001	10,000,000,000	100	0.00000001	0.000001
5	0.0000001	10,000,000,000	1000	0.0000001	0.00001
6	0.000001	10,000,000,000	10000	0.000001	0.0001
7	0.00001	10,000,000,000	100000	0.00001	0.001
8	0.0001	10,000,000,000	1000000	0.0001	0.01
9	0.001	10,000,000,000	10000000	0.001	0.1
10	0.01	10,000,000,000	100000000	0.01	0.3
11	0.1	10,000,000,000	1000000000	0.1	0.5
12	1	10,000,000,000	10000000000	1	1

Click to Expand

Most rows make the assumption that if intelligent life appears on a planet, that life will travel to other planets and assist in the evolution of intelligent life on other planets (the assumption is that an average of 100 planets will be assisted in such a way). To see the effect of improbability minimization, we can compare columns D and E. In almost all cases the odds in column E are about 100 times greater than the odds in column D. I have adjusted the numbers in cells E10, E11, and E12 to avoid having a probability greater than 1.

This table illustrates the general idea that under many different assumptions about the likelihood of intelligent life evolving on small planets, by assuming the possibility of extraterrestrial intervention in our evolution, we can end up with a less farfetched scenario that requires less of a long shot for it to occur. So contrary to the first impression you may have from watching cheesy shows like A*ncient Aliens*, the idea of extraterrestrial intervention in earthly evolution would actually seem to be quite respectable from the standpoint of mathematical plausibility (which does not necessarily mean it is likely that such an intervention occurred).

It is interesting to compare the principle of improbability minimization I have evoked here with another worthy intellectual principle: the principle of Occam's Razor, the old and honored principle that “entities should not be multiplied beyond necessity,” or that the simplest explanation is best. Both are good principles, and in many cases both principles lead us to the same conclusion. For example, if I see an ordinary light in the sky, then the principle of improbability minimization leads me to prefer an explanation that the light is an ordinary airplane rather than an alien spacecraft; and the principle of Occam's razor leads me to the same conclusion. But there are some cases in which the two principles may lead us to different

conclusions. I may note the very interesting fact that the simplest explanation sometimes has a much lower probability than a more complicated explanation.

For example, suppose a young wife dies of an apparent heart attack in her backyard, apparently from an electrical shock. We can believe she died from a simple lightning bolt, or we can believe she died because of some complicated murder plot hatched by her husband (perhaps because of some fancy electrocuting gadget rigged up by the husband). In this case the principle of Occam's Razor leads us to favor the lightning bolt explanation – it is simpler and also natural. But the principle of improbability minimization leads us to a different answer. Following that principle, we prefer the murder plot explanation, because we wish to avoid believing in the extremely improbable occurrence of a lightning bolt killing the woman.

The question of alien intervention in earthly evolution is another case where the principle of Occam's Razor and the principle of improbability minimization lead us in different directions. The principle of Occam's Razor tends to lead us to shun the idea that any extraterrestrials intervened in earthly evolution, on the grounds that it involves introducing additional entities. But the principle of improbability minimization may lead us to think warmly of such a hypothesis, on the grounds that the overall chance of intelligent life evolving on Earth is much higher if we concede such an evolution may have received external assistance.

Posted by Mark Mahin at 8:30 AM No comments:

Labels: evolution, extraterrestrial life, panspermia

Wednesday, November 27, 2013

Darwinism Fails to Explain Man's Higher Faculties

The main principle behind Darwinian evolution is the principle that organisms tend to gradually evolve characteristics that give them a greater survival value in their environment. This principle allows us to explain many facets of humanity, particularly everything underneath our necks. We have arms and hands because we are descended from species that used to live in trees, and needed arms and hands to swing from branch to branch. We have legs capable of running fast, because we needed those to escape from predators. We have good vision because we needed that to find food and spot predators. All of these things can be explained through the principle of natural selection – survival of the fittest. Most characteristics of a species that make the individual members of a species more likely to survive (until they reproduce) can be explained by referring to natural selection and evolution.

However, there are some important aspects of human nature that seem to be difficult or impossible to adequately explain by using an explanation of evolution and natural selection. Humans have inner selves and personalities. Humans are great at language, and at formulating very abstract ideas. Humans are capable of wonder, joy, love, guilt, compassion, imagination, and spirituality. Humans can create art and literature, ponder their own deaths, wonder about the meaning of life and the nature of the universe, create and follow moral codes, and consider philosophical matters.

It is hard to explain any of this by evoking evolution or natural selection, because most of it has no survival value, from an evolutionary standpoint of making an organism more likely to survive until it reproduces. 50,000 years ago a human who felt wonder by looking at a sunset was not any more likely to survive than a human who did not (in fact, the sunset-

appreciating human was actually less likely to survive, as he might let down his guard and be attacked by a predator while he was enjoying the sunset). We can't explain the origin of man's talents at art, philosophy, mathematics and literature by imagining that such talents evolved because people who had them were more likely to survive until reproduction.

Darwinism is bad at explaining these things.

Imagine you're a cave man 50,000 years ago. Life is pretty simple: find food, don't freeze to death, and don't get eaten by a predator. People at that time had no need for language, math, art, literature, planning abilities, or inner thoughts. Grunts and hand signals would have worked just fine to alert your fellow cave man when you see a predator. So how did man get all of his higher faculties that have allowed him to create art, novels, science, philosophy, and government?

At the John Templeton Foundation website, there is a page in which professors and experts attempt to answer the question, “Does evolution explain human nature?” The short answers given by a panel of professors and experts run the gamut:

Obviously, says the monkey.
Except where it matters.
Quite well.
Not entirely.
More fully by the day.
Not yet.
In part.
Yes.
Only up to a point.
Yes, but...
Totally, for a Martian.
Yes and no.

That's a spectrum of answers, but when we look at the answers in detail, things don't go too well for those trying to answer the “Does evolution explain human nature?” question affirmatively. The expert giving the answer “Obviously, says the monkey” loses his credibility by making the ridiculous claim that humans “have no basic wants or needs that cannot also be observed in our close relatives” such as chimpanzees. I guess this fellow has never heard of the desire to obtain truth or the need to make a lasting accomplishment or numerous other wants or needs that humans have and chimps don't have. His “man is just a chimp” reasoning fails to persuade.

Another expert who answers “Yes” to “Does evolution explain human nature?” then undermines his own answer by saying this: “Why there is subjective experience at all - is actually a mystery. Only a few Darwinian thinkers, such as Steven Pinker and the late John Maynard Smith, have appreciated this problem.” So if that's true, then it's not right to answer Yes to the question “Does evolution explain human nature.” This is the “hard problem of consciousness,” and there is a confession that “only a few Darwinian thinkers have appreciated the problem,” which sure doesn't sound like evolutionary theory has a real answer for it.

The typical evolutionary explanation involves random mutations and random variance plus survival of the fittest. For example, imagine a population of early humans. Because of random mutations and random variance, some of the population would by chance have longer, stronger legs. Then more of that population would survive because those organisms could run faster to escape predators. That works fine for explaining the evolution of certain physical characteristics of the human body, and also some parts of the brain involving human perception.

But the same type of explanation would seem to be impotent and useless for explaining some higher faculties of mankind – simply because we would not expect that any random mutations or random variance would ever cause some early humans to have a slightly higher amount of such faculties. It would not seem that random variance or random mutations could cause a certain number of early humans to be a little more capable of love, guilt, language, mathematics, self-introspection, philosophy, inner lives, spirituality, wonder, or advanced moral concepts. It almost seems to require a kind of quantum jump to go from an animal mind to a mind capable of such things. Can we really imagine that a random mutation or a random variance would cause an organism to have a little bit of an inner self when its parents had no inner self?

Evolution is a fact, and we know that man is very old and the universe is much, much older. But nevertheless we have a problem in explaining how evolution could have produced all of human faculties. Among the possible ways to explain this discrepancy are as follows:

1. There might have been some extraterrestrial interference in human evolution which led us to develop some of our advanced faculties. Our evolution could have been altered by visitors from another planet.
2. Evolution might have been assisted by either a divine influence, or by some unknown insentient force of nature that we do not currently understand.
3. There may be some philosophical explanation for the origin or existence of advanced human faculties, perhaps something along the lines of a philosophy that grants consciousness more of a central role rather than making it a mere by-product of unconscious natural processes. It could be that mind comes before matter, rather than the other way around.

I'm not sure what the answer is – perhaps one of these three, or perhaps something else. I do think that evolution is overall a fine theory that explains much. But champions of evolution may be hurting their own cause when they try to make it look as if evolution can explain the entire human mind. When advocates of a theory claim too much for it, they may make it more likely that someone will reject the theory altogether.

Rather then pretending we have most or all of the pieces of nature's jigsaw puzzle, we should admit that we have only a few, and that our knowledge of nature is only fragmentary.

Postscript: my theory of a programmed material universe (described here and here) may offer an additional possibility for explaining the origin of Mind. I noticed recently a web post that describes a position similar to that taken in this post. It refers to the book *Mind & Cosmos* by Thomas Nagel:

> Nagel is an eminent philosopher and professor at NYU. In *Mind & Cosmos*, he shows with terse, meticulous thoroughness why mainstream thought on the workings of the mind is intellectually bankrupt. He explains why Darwinian evolution is insufficient to explain the emergence of consciousness—the capacity to feel or experience the world.

Posted by Mark Mahin at 7:56 AM No comments:

Labels: Darwinism, evolution, natural selection, origin of Mind, philosophy

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Friday, February 7, 2020

Supersymmetry is the Standard Model's Wastrel Brother

Online at *Symmetry* magazine there is a new article that rather clearly explains one of the biggest cases of cosmic fine-tuning: the fine-tuning of the Higgs mass. Thankfully the magazine has corrected the original version of the article, which gave people wrong ideas by failing to use superscripts in some crucial places.

The issue of the fine-tuning of the Higgs mass (the mass of the Higgs boson) was skillfully explained by physicist Ben Allanach in a previous article at the Aeon site:

"Behind the question of mass, an even bigger and uglier problem was lurking in the background of the Standard Model: why is the Higgs boson so light? In experiments it weighed in at 125 times the mass of a proton. But calculations using the theory implied that it should be much bigger – roughly ten million billion times bigger, in fact....Quantum fluctuations of ultra-heavy particle pairs should have a profound effect on the Higgs boson, whose mass is very sensitive to them....One logical option is that nature has chosen the initial value of the Higgs boson mass to precisely offset these quantum fluctuations, to an accuracy of one in 10^{16}. However, that possibility seems remote at best, because the initial value and the quantum fluctuation have nothing to do with each other. It would be akin to dropping a sharp pencil onto a table and having it land exactly upright, balanced on its point. In physics terms, the configuration of the pencil is unnatural or fine-tuned. Just as the movement of air or tiny vibrations should make the pencil fall over, the mass of the Higgs shouldn't be so perfectly calibrated that it has the ability to cancel out quantum fluctuations. However, instead of an uncanny correspondence, maybe the naturalness problem with the Higgs boson could be explained away by a new, more foundational theory: supersymmetry."

In the new article in *Symmetry* magazine, we have a similar explanation:

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► April (8)
► March (9)

"To understand what's fishy about the observable Higgs mass being so low, first you must know that it is actually the sum of two inputs: the bare Higgs mass (which we don't know) plus contributions from all the other Standard Model particles, contributions collectively known as "quantum corrections." The second number in the equation is an enormous negative, coming in around minus 10^{18} GeV. Compared to that, the result of the equation, 125 GeV, is extremely small, close to zero. That means the first number, the bare Higgs mass, must be almost the opposite, to so nearly cancel it out. To some physicists, this is an unacceptably strange coincidence."

How big a coincidence? The *Symmetry* article later quotes physicist Lawrence Lee Jr. as saying "the conundrum with the Higgs mass, which would require fine-tuning on the order of 1-in-10^{34}," which is a coincidence like the coincidence of you correctly guessing the full phone numbers of three consecutive strangers.

Scientists should have just accepted this case of very precise fine-tuning in nature. But instead, many of them made a long, quixotic, futile attempt to overthrow it (like someone trying to overthrow the observation that the sun is hot, with some elaborate theory trying to explain how the sun isn't really hot). Why did they do that? Because they had a motivation, an ideological motivation rather than the motivation of simply discovering truth. Their ideological motivation was related to a belief that the universe should not be anything that looked like a product of design. This ideological motivation is clearly stated in the *Symmetry* article by physicist Lee, who states it as follows: "In general, what we want from our theories—and in some way, our universe—is that nothing seems too contrived." If you want for the universe to not "seem too contrived," then you may twist yourself into knots trying to explain away cases of apparent fine-tuning in the universe.

- February (7)
- January (8)

- 2019 (95)
- 2018 (93)
- 2017 (92)
- 2016 (92)
- 2015 (97)
- 2014 (163)
- 2013 (166)

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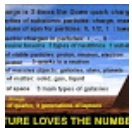
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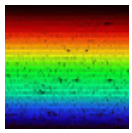
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This is exactly what physicists did, both with the theory of supersymmetry (an attempt to explain away the fine-tuning discussed above), and the ever-changing and never-substantiated theory of cosmic inflation (designed to explain away fine-tuning at the time of the Big Bang, such as the Big Bang having precisely the right expansion rate to allow for galaxies to form). Supersymmetry (also called SUSY) involves the speculation that each of the 17 subatomic particles in the Standard Model has a matching undiscovered "superpartner" particle. This would involve 17 different coincidences in nature. The overall chance of having so many exact coincidences is much smaller than the chance of the Higgs mass or Higgs boson coincidentally being fine-tuned. So nothing is actually done to reduce fine-tuning. The theory simply reduces fine-tuning in one place (the Higgs boson or Higgs mass), at the price of adding it in 17 other places, all of these exact matches between the particles in the Standard Model and their imagined "superpartners." It's a similar deal with the cosmic inflation theory, which tries to get rid of extremely precise fine-tuning in one place (the expansion rate of the universe at the time of the Big Bang), at the price of adding even more fine-tuning scattered in various other places, various types of fine-tuning needed to make any cosmic inflation theory viable.

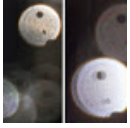
Supersymmetry has been a complete observational failure. If we can compare the Standard Model of physics to a high-achieving son who delights his parents with his success, we can compare supersymmetry to a wastrel brother who bungles his life away without accomplishing anything.

The article in *Symmetry* says not a word about the utter failure of supersymmetry theories in all empirical tests thus far. The article should have had a passage like this:

Physicists spent countless hundreds of man-years on the theory of supersymmetry. Trying to make the universe look "not too contrived," they spun out ever-more-elaborate theories that evoked an abundance of contrivances to try to explain away the fine-tuning of the Higgs mass. But it all seems like a gigantic waste of time. Their theories have failed every test, and the Large Hadron Collider keeps shooting down their elaborate speculations.

But instead of getting a passage anything like that, we get no mention of the utter empirical failure of supersymmetry theories. Instead the *Symmetry* article ends with this supremely bombastic sky-high-hubris passage making it sound like the author has learned no lesson from the gigantic supersymmetry midadventure:

"However bothered they are by apparent fine-tuning, in an



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ideal world, physicists will find the final Theory of Everything that can explain the underlying causes for every observed parameter in the universe. If physicists ever reach that point, Haley says, 'then you'd really know you solved physics.' "

Posted by Mark Mahin at 8:30 AM No comments:

Labels: cosmic fine tuning, supersymmetry

Saturday, May 25, 2019

Where Adams Goes Wrong on Cosmic Fine-tuning

This year scientist Fred C. Adams published to the physics paper server a massive paper on the topic of cosmic fine-tuning (a topic I have often discussed on this blog). The paper of more than 200 pages (entitled "The Degree of Fine Tuning in our Universe -- and Others") describes many cases in which our existence depends on cases of some number in nature having (against all odds) a value allowing the universe to be compatible with the existence of life. There are several important ways in which the paper goes wrong or creates inappropriate impressions. I list them below.

Problem #1: Using habitability as the criteria for judging fine-tuning, rather than "something as good as what we have."

Part of the case for cosmic fine-tuning involves the existence of stars. It turns out that some improbable set of coincidences have to occur for a universe to have any stars at all, and some far more improbable set of coincidences have to occur for a universe to have very stable, bright, long-lived stars like our sun.

Adams repeatedly attempts to convince readers that the universe could have had fundamental constants different from what we have, and that the universe would still have been habitable because *some* type of star might have existed. When reasoning like this, he is using an inappropriate rule-of-thumb for judging fine-tuning. Below are two possible rules-of-thumb when judging fine-tuning in a universe:

Rule #1: Consider how unlikely it would be that a random universe would have conditions as suitable for the appearance and long-term survival of life as we have in our universe.

Rule #2: Consider only how unlikely it would be that a random universe would have conditions allowing some type of life.

Rule #1 is the appropriate rule to use when considering the issue of cosmic-fine tuning. But Adams seems to be operating under a rule-of-thumb such as Rule #2. For example, he tries to show that a universe significantly different from ours might have allowed red dwarf stars to exist. But such a possibility is irrelevant. The relevant consideration: how unlikely is it that we would have got a situation as fortunate as the physical situation that exists in our universe, in which stars like the sun (more suitable for supporting life than red-dwarf stars) exist?

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Why a Clique of Scientists Might Do Worse at Judging Truth Than a Jury

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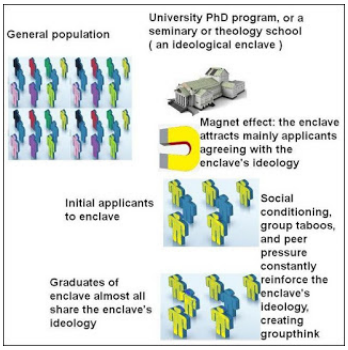

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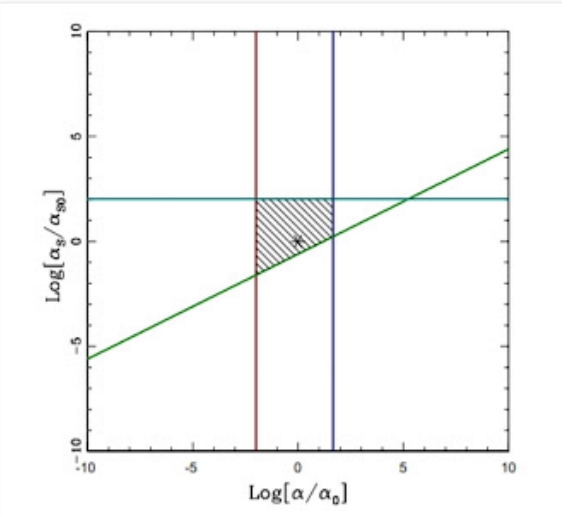
Since "red dwarfs are far more variable and violent than their more stable, larger cousins" such as sun-like stars (according to this source), we should be considering the fine-tuning needed to get stars like our sun, not just any type of star like a red dwarf.

I can give an analogy. Imagine I saw in the woods a log cabin house. If I am judging whether this structure is the result of chance or design, I should be considering how unlikely it would be that something as good as this might arise by chance. You could do all kinds of arguments trying to show that it is not so improbable that a log structure much worse than the one observed might not be too unlikely (such as arguments showing that it wouldn't be too hard for a few falling trees to make a primitive rain shelter). But such arguments are irrelevant. The relevant thing to consider is: how unlikely would it be that a structure as good as the one observed would appear by chance? Similarly, living in a universe that allows an opportunity for humans to continue living on this planet for billions of years with stable solar radiation, the relevant consideration is: how unlikely that a universe as physically fortunate as ours would exist by chance? Discussions about how microbes might exist in a very different universe (or intelligent creatures living precariously near unstable suns) are irrelevant, because such universes do not involve physical conditions as good as the one we have.

Problem #2: Charts that create the wrong impression because of a "camera near the needle hole" and a logarithmic scale.

On page 29 of the paper Adams gives us a chart showing some fine-tuning needed for the ratio between what is called the fine-structure constant and the strong nuclear force. We see the following diagram, using a logarithmic scale that exaggerates the relative size of the shaded region. If the ratio had been outside the shaded region, stars could not have existed in our universe.



This doesn't seem like that lucky a coincidence, until you consider that creating a chart like this is like trying a make a needle hole look big by putting your camera right next to the needle hole. We know of no theoretical reason why the ratio described in this chart could not have been anywhere between

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
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- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
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- augmented reality (2)
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- Australian mystery lights (1)
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- behavior genetics (1)
- Bible (1)
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- biconsciousness (1)
- Big Bang (29)
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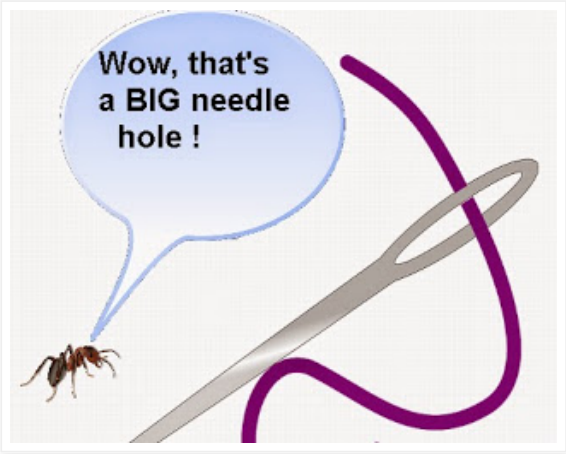
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

.0000000000000000000000000000000000000000001 and 1,000,000,000,000,000,000,000,000,000,000,000. So by using such a narrow scale, the chart gives us the wrong idea. In a a less misleading chart that used an overall scale vastly bigger, we would see this shaded region as merely a tiny point on the chart, occupying less than a millionth of the total area on the chart. Then we would realize that a fantastically improbable coincidence is required for nature to have threaded this needle hole. Adams also uses a logarithmic scale for figure 5, to make another such tiny "needle hole" (that must be threaded for life to exist) look like it is relatively big.



Needle holes can look big when your eye is right next to them

Problem #3: An under-estimation of the strong force sensitivity.

On page 30 of the paper, Adams argues that the strong nuclear force (the strong coupling constant) isn't terribly fine-tuned, and might vary by as much as 1000 without preventing life. He refuses to accept what quite a few scientists have pointed out: that it would be very damaging for the habitability of the universe if the strong nuclear force were only a few percent stronger. Quite a few scientists have pointed out that in such a case, the diproton (a nucleus consisting of two protons and no neutrons) would be stable, and that would drastically affect the nature of stars. Adams attempt to dismiss such reasoning falls flat. He claims on page 31 that if the diproton existed, it would cause only a “modest decrease in the operating temperatures of stellar cores," but then tells us that this would cause a 1500% change in such temperatures (a change from about 15 million to one million), which is hardly modest.

Adams ignores the fact that small changes in the strong nuclear force would probably rule out lucky carbon resonances that are necessary for large amounts of carbon to exist. Also, Adams ignores the consideration that if the strong nuclear force had been much stronger, the early universe's hydrogen would have been converted into helium, leaving no hydrogen to eventually allow the existence of water. In this paper, two physicists state, “we show that provided the increase in strong force coupling constant is less than about 50% substantial amounts of hydrogen remain.” What that suggests is that if the strong force had been more 50% greater, the universe's habitability would have been greatly damaged, and life probably would have been

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

impossible. That means the strong nuclear force is 1000 times more sensitive and fine-tuned that Adams has estimated.

Problem #4: An under-estimation of the fine structure constant's sensitivity and sensitivity of the quark mass.

On page 140 of the paper, Adams suggests that the fine structure constant (related to the strength of the electromagnetic force) isn't terribly fine-tuned, and might vary by as much as 10000 times without preventing life. His previous discussion of the sensitivity of the fine structure constant involved merely a discussion of how a change in the constant would affect the origin of elements in the Big Bang. But there are other reasons for thinking that the fine structure is very fine-tuned, reasons Adams hasn't paid attention to. A stellar process called the triple-alpha process is necessary for large amounts of both carbon and oxygen to be formed in in the universe. In their paper "Viability of Carbon-Based Life as a Function of the Light Quark Mass," Epelbaum and others state that the "formation of carbon and oxygen in our Universe would survive a change" of about 2% in the quark mass or about 2% in the fine-structure constant, but that "beyond such relatively small changes, the anthropic principle appears necessary at this time to explain the observed reaction rate of the triple-alpha process." This is a sensitivity more than 10,000 times greater than Adams estimates. It's a case that we can call very precise fine-tuning. On page 140, Adams gives estimates of the biological sensitivity of the quark masses, but they ignore the consideration just mentioned, and under-estimates the sensitivity of these parameters.

Problem #5: The misleading table that tries to make radio-fine tuning seem more precise than examples of cosmic fine-tuning.

On page 140 Adams give us the table below:

Ranges of Parameter Values for Viable Universes

quantity	symbol	observed value	range (decades)
Up quark mass	m_u	2.3 MeV	> 3
Down quark mass	m_d	4.8 MeV	0.85
Electron-proton mass ratio	β	1/1836	5
Up-down quark mass difference	δm	2.5 MeV	1
Gravitational constant	α_G	6×10^{-39}	> 10
Weak coupling constant	α_w	10^{-5}	6+
Fine structure constant	α	1/137	4
Strong coupling constant	α_s	15	3
Fluctuation amplitude	Q	10^{-5}	4
Baryon to photon ratio	η	6×10^{-10}	6
Dark matter abundance	δ	3×10^{-9}	6
Vacuum energy scale	λ	0.003 eV	10+
AM Radio	f_{AM}	535 – 1605 kHz	0.0043
FM Radio	f_{FM}	88 – 108 MHz	0.00087

Table 2: Table of the fundamental and cosmological parameters and their allowed ranges. The ranges are expressed in terms of decades of allowed variation, as defined by equation (226). The ranges expressed for the mass of the up quark and the gravitational constant are lower limits on the full range. The ranges listed for the weak force and the energy scale of the vacuum correspond only to variations to greater values (any lower values are allowed). For comparison, the final two lines specify the amount of tuning required for radio reception (see text).

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

The range listed in the third column represents what Adams thinks is the maximum multiplier that could be applied to these parameters without ruling out life in our universe. One problem is that some of the ranges listed are way too large, first because Adams is frequently being over-generous in estimating by how much such things could vary without worsening our universe's physical habitability (for reasons I previously discussed), and second because Adams is using the wrong rule for judging fine-tuning, considering "universes that allow life" when he should be considering "universes as habitable and physically favorable as ours."

Another problem is that the arrangement of the table suggests that the parameters discussed are much less fine-tuned than a radio that is set to just the right radio station, but most of the fundamental constants in the table are actually far more fine-tuned than such a radio. To clarify this matter, we must consider the matter of possibility spaces in these cases. A possibility space is the range of possible values that a parameter might have. One example of a possibility space is the possible ages of humans, which is between 0 and about 120. For an AM radio the possibility space is between 535 and 1605 kilohertz.

What are the possibility spaces for the fundamental constants? For the constants involving one of the four fundamental forces (the gravitational constant, the fine-structure constant, the weak coupling constant and the strong coupling constant), we know that the four fundamental forces differ by about 40 orders of magnitude in their strength. The strong nuclear force is about 10,000,000,000,000,000,000,000,000,000,000,000,000,000 times stronger than the gravitational force. So a reasonable estimate of the possibility space for each of these constants is to assume that any one of them might have had a value 10^{40} times smaller or weaker than the actual value of the constant.

So the possibility space involving the four fundamental coupling constants is something like 1,000,000,000,000,000,000,000,000,000,000,000,000 larger than the possibility space involving an AM radio. So, for example, even if the strong coupling constant could have varied by 1000 times as Adam claims, and still have allowed for life, for it to have such a value would be a case of fine-tuning more than 1,000,000,000,000 times greater than an AM radio that is randomly set on just the frequency. For the range of values between .001 and 1000 times the actual value of the strong nuclear force is just the tiniest fraction within a possibility space in which the strong nuclear force can vary by 10^{40} times. It's the same situation for the gravitational constant and the fine-structure constant (involving the electromagnetic force). Even if we go by Adam's severe under-estimations of the biological sensitivity of these constants, and use the estimates he has made, it is a still a situation that this is fine tuning trillions of times more unlikely to occur by chance than a radio being set on just the right station by chance, because of the gigantic probability space in which

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

fundamental forces might vary by 40 orders of magnitude.

A similar situation exists in regard to what Adams calls on page 140 the vacuum energy scale. This refers to the density of energy in ordinary outer space such as interstellar space. This is believed to be extremely small but nonzero. Adams estimates that it could have been 10 orders of magnitude larger without preventing our universe's habitability. But physicists know of very strong reasons for thinking that this density should actually be 10^{60} times or 10^{120} times greater than it is (it has to do with all of the virtual particles that quantum field theory says a vacuum should be packed with). So for the value of the vacuum energy density to be as low as it is would seem to require a coincidence with a likelihood of less than 1 in 10^{50} . Similarly, if a random number generator is programmed to pick a random number between 1 and 10^{60} with an equal probability of any number between those two numbers being the random number, there is only a microscopic chance of the number being between 1 in 10^{50} .

Adam's chart has been cleverly arranged to give us the impression that the fundamental constants are less fine-tuned than a radio set on the right station, but the opposite is true. The main fundamental constants are trillions of times more fine-tuned than a radio set on the right station. The reason is partially because the possibility space involving such constants is a more than a billion quadrillion times larger than the small possibility space involving what station a radio might be tuned to.

Problem #6: Omitting the best cases from his summary table.

Another huge shortcoming of Adams' paper is that he has omitted some of the biggest cases of cosmic fine-tuning from his summary table on page 140. One of the biggest cases of fine-tuning involves the universe's initial expansion rate. Scientists say that at the very beginning of the Big Bang, the universe's expansion rate was fine-tuned to more than 1 part in 10^{50} , so that the universe's density was very precisely equal to what is called the critical density. If the expansion rate had not been so precisely fine-tuned, galaxies would never have formed. Adams admits this on page 40-41 of his paper. There is an unproven theory designed to explain away this fine-tuning, in the sense of imagining some other circumstances that might have explained it. But regardless of that, such a case of fine-tuning should be included in any summary table listing the universe's fine-tuning (particularly since the theory designed to explain away the fine-tuning of the universe's expansion rate, called the cosmic inflation theory, is a theory that has many fine-tuning requirements of its own, and does not result in an actual reduction of the universe's overall fine-tuning even if the theory were true). So why do we not see this case in Adams' summary table entitled "Range of Parameter Values for Habitable Universe"?

Adams' summary table also makes no mention of the fine-tuning involving the Higgs mass or the Higgs boson, what is called "the hierarchy problem." This is a case of fine-tuning that so bothered

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

particle physicists that many of them spent decades creating speculative theories such as supersymmetry designed to explain away this fine-tuning, which they sometimes said was so precise it was like a pencil balanced on its head. Referring to this matter, this paper says, "in order to get the required low Higgs mass, the bare mass must be fine-tuned to dozens of significant places." This is clearly one of the biggest cases of cosmic fine-tuning, but Adams has conveniently omitted it from his summary table.

Then there is the case of the universe's initial entropy, another case of very precise fine-tuning that Adams has also ignored in his summary table. Cosmologists such as Roger Penrose have stated that for the universe to have the relatively low entropy it now has, the entropy at the time of the Big Bang must have been fantastically small, completely at odds from what we would expect by chance. Only universes starting out in an incredibly low entropy state can end up forming galaxies and yielding life. As I discuss here, in a recent book Penrose suggested that the initial entropy conditions were so improbable that it would be more likely that the Earth and all of its organisms would have suddenly formed from a chance collision of particles from outer space. This gigantic case of very precise cosmic fine-tuning is not mentioned on Adams' summary table.

Then there is the case of the most precise fine-tuning known locally in nature, the precise equality of the absolute value of the proton value and the absolute value of the electron charge. Each proton in the universe has a mass 1836 times greater than the mass of each electron. From this fact, you might guess that the electric charge on each proton is much greater than the electric charge on each electron. But instead the absolute value of the electric charge on each proton is very precisely the same as the absolute value of the electric charge on each electron (absolute value means the value not considering the sign that is positive for protons and negative for electrons). A scientific experimental study determined that the absolute value of the proton charge differs by less than one part in 1,000,000,000,000,000,000 from the absolute value of the electron charge.

RATIO OF PROTON MASS TO ELECTRON MASS:
1836.152672
RATIO OF PROTON CHARGE TO ELECTRON CHARGE:
1.000000000000000

This is a coincidence we would expect to find in fewer than 1 in 1,000,000,000,000,000,000 random universes, and it is a case of extremely precise fine-tuning that is absolutely necessary for our existence. Since the electromagnetic force (one of the four

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

fundamental forces) is roughly 10 to the thirty-seventh power times stronger than the force of gravity that holds planets and stars together, a very slight difference between the absolute value of the proton charge and the absolute value of the electron charge would create an electrical imbalance that would prevent stars and planets from holding together by gravity (as discussed here). Similarly, a slight difference between the absolute value of the proton charge and the absolute value of the electron charge would prevent organic chemistry in a hundred different ways. Why has Adams failed to mention in his summary table (or anywhere in his paper) so precise a case of biologically necessary fine-tuning?

Clearly, Adams has left out from his summary table most of the best cases of cosmic fine-tuning. His table is like some table entitled "Famous Yankee Hitters" designed to make us think that the New York Yankees haven't had very good hitters, a table that conveniently omits the cases of Babe Ruth, Lou Gehrig, Joe DiMaggio, and Micky Mantle.

Below is a table that will serve as a corrective for Adams' misleading table. I will list some fundamental constants or parameters in the first column. The second column gives a rough idea of the size of the possibility space regarding the particular item in the first column. The third column tells us whether the constant, parameter or situation is more unlikely than 1 chance in 10,000 to be in the right range, purely by chance. The fourth column tells us whether the constant, parameter or situation is more unlikely than 1 chance in a billion to be in the right range, purely by chance. For the cosmic parameters "in the right range" means "as suitable for long-lasting intelligent life as the item is in our universe." The "Yes" answers follow from various sensitivity estimates in this post, in Adams' paper, and in the existing literature on this topic (which includes these items). For simplicity I'll skip several items of cosmic fine tuning such as those involving quark masses and the electron/proton mass ratio.

Parameter or Constant or Situation	**Size of Possibility Space**	**More Unlikely Than 1 in 10,000 for Item to Be in Right Range, by Chance?**	**More Unlikely Than 1 in 1,000,000,000 for Item to Be in Right Range, by Chance?**
Strong nuclear coupling constant	10^{40} (difference between weakest fundamental force and strongest one)	Yes	Yes

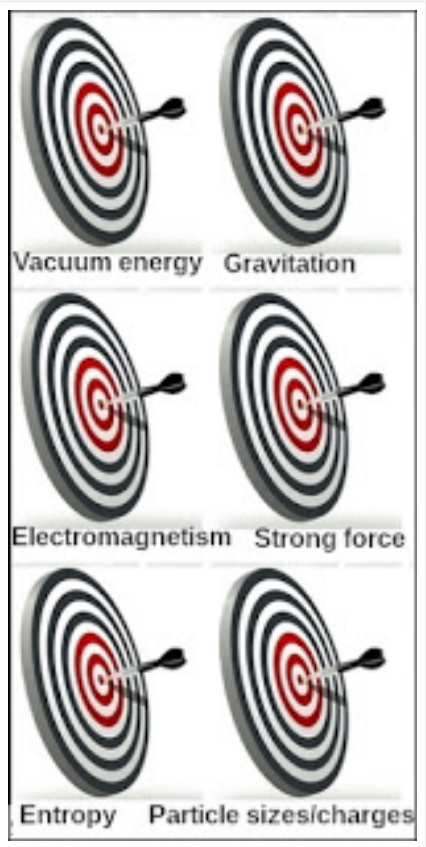
- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

Gravitational coupling constant	10^{40} (difference between weakest fundamental force and strongest one)	Yes	Yes
Electromagnetic coupling constant	10^{40} (difference between weakest fundamental force and strongest one)	Yes	Yes
Ratio of absolute value of proton charge to absolute value of electron charge	.000000001 to 1000000000	Yes	Yes
Ratio of universe's initial density to critical density (related to initial expansion rate)	10^{40} to $1/10^{40}$	Yes	Yes
Initial cosmic entropy level	Between 0 and some incredibly large number	Yes	Yes
Vacuum energy density	Between 0 and 10^{60} or 10^{120} its current value, as suggested by quantum field theory	Yes	Yes
AM radio tuned to your favorite AM station	535-1605 kilohertz	No	No
FM radio tuned to your favorite FM station	88-108 megahertz	No	No

The truth is that each of these cases of cosmic fine-tuning is trillions of time more unlikely to have occurred by chance than a random radio being exactly tuned to your favorite AM station or FM station. To imagine the overall likelihood of all of these cases of fine-tuning happening accidentally, we might imagine an archer who successfully

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

hits more than 7 archery targets randomly positioned around the circumference of a 180-meter circle, with the archer being at the center of the circle and blindfolded.



Postscript: In June 2019 some scientists published a paper entitled "An update on fine-tunings in the triple alpha process." They end by stating "a relatively small ~0.5% shift" in the light quark mass "would eliminate carbon-oxygen based life from the universe." This is a case of very precise fine-tuning, contrary to the claims of Adams, who tries to make it look like a parameter that could have differed by three orders of magnitude (a factor of about 1000 times). The scientists also state that "such life could possibly persist up to ~7.5% shifts" in the electromagnetic coupling constant (equivalent to the fine structure constant). This is also a case of precise fine-tuning, contrary to the claims of Adams, who tries to make the fine structure constant look like a parameter that could have differed by four orders of magnitude (a factor of about 10,000 times).

In his table on page 140 Adams has told us that the electron/proton mass ratio isn't very sensitive to changes. But in his book *The Particle at the End of the Universe*, page 145 to 146, physicist Sean Carroll states the following:

"The size of atoms...is determined by...the mass of the electron. If that mass were less, atoms would be a lot larger. .. If the mass of the electron changed just a little bit, we would have things like 'molecules' and 'chemistry', but the specific rules that we know in the real world would change in important ways...Complicated molecules like DNA or proteins or living cells would be messed up beyond repair. To bring it home:

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

Change the mass of the electron just a little bit, and all life would instantly end."

Posted by Mark Mahin at 9:02 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmology, physics

Friday, April 19, 2019

Motivated Reasoning of the "Cosmic Inflation" Storytellers

In 2017 *Scientific American* published a sharp critique of the theory of cosmic inflation originally advanced by Alan Guth (not to be confused with the more general Big Bang theory). The theory of cosmic inflation (which arose around 1980) is a kind of baroque add-on to the Big Bang theory that arose decades earlier. The Big Bang theory asserts the very general idea that the universe began suddenly in a state of incredible density, perhaps the infinite density called a singularity; and that the universe has been expanding ever since. The cosmic inflation theory makes a much more specific claim, a claim about less than one second of this expansion – that during only a small fraction of the first second of the expansion, there was a special super-fast type of expansion called exponential expansion. ("Cosmic inflation" is a very bad name for this theory, as it creates all kinds of confusion in which people confuse the verified idea of an expanding universe and the shaky idea of cosmic inflation. The term "cosmic inflation" refers not to cosmic expansion in general, but to the very specific idea that the universe's expansion was once a type of expansion -- exponential expansion -- radically faster and more dramatic than its current linear rate of expansion.)

The article in Scientific America criticizing the theory of cosmic inflation was by three scientists (Anna Ijjas, Paul J. Steinhardt, Abraham Loeb), one a Harvard professor and another a Princeton professor. It was filled with very good points that should be read by anyone curious about the claims of the cosmic inflation theory. You can read the article on a Harvard web site here. Or you can go to this site by the article's authors, summarizing their critique of the cosmic inflation theory.

Recently a very long scientific paper appeared on the ArXiv physics paper server, a paper with the cute title "Cosmic Inflation: Trick or Treat?" In its very first words the paper's author (Jerome Martin) misinforms us, because he refers to cosmic inflation as something that was "discovered almost 40 years ago." Discovery is a word that should be used only for observational results in science. Cosmic inflation (the speculation that the universe underwent an instant of exponential expansion) was never discovered or observed by scientists. In fact, it is impossible that this "cosmic inflation" or exponential expansion ever could be observed. During the first

300,000 years of the universe's history, the density of matter and energy was so great that all light particles were thoroughly scattered and shuffled a million times. It is therefore physically impossible that we ever will be able to observe any unscrambled light signals from the first 300,000 years of the universe's history. So we will never be able to get observations that might verify the claim of cosmic inflation theorists that the universe underwent an instant of exponential expansion.

At the end of the paper the author claims that the cosmic inflation theory has “all of the criterions that a good scientific theory should possess.” The author gives only two examples of such things: first, the claim that the cosmic inflation theory is falsifiable, and second that “inflation has been able to make predictions.” His claim that the theory is falsifiable is not very solid. He says that the cosmic inflation theory could be falsified if it were found that the universe did not have what is called a flat geometry, but then he refers us to a version of the cosmic inflation theory that predicted a universe without such a flat geometry. So cosmic inflation theory isn't really falsifiable at all. So many papers have been published speculating about different versions of cosmic inflation theory that the theory can be made to work with any future observations. Harvard astronomer Loeb says here the cosmic inflation theory "cannot be falsified."

It is not at all true that the cosmic inflation theory has “all of the criterions that a good scientific theory should possess,” or even most of those characteristics. Below is a list of some of the characteristics that are desirable in a good scientific theory. You can have a good scientific theory without having all of these characteristics, but the more of these characteristics that you have, the more highly regarded your scientific theory should be.

1. **The theory is potentially verifiable.** While falsification has been widely discussed in connection with scientific theories, it should not be forgotten that the opposite of falsification (verification) is equally important. Every good scientific theory should be potentially verifiable, meaning that there should always be some reasonable hypothetical set of observations that might verify the theory. In the case of the cosmic inflation theory, we can imagine no such observations. The only thing that could verify the cosmic inflation theory would be if we were to look back to the first instant of the universe and observe exponential expansion occurring. But, as I previously mentioned, there is a reason why such an observation can never possibly occur, no matter how powerful future telescopes are. The reason is that the density of the very early universe was so great that all light signals from the first 300,000 years of the history were

hopelessly shuffled, scrambled and scattered millions of times.

2. **The theory merely requires us to believe in something very simple.** A very desirable characteristic of a scientific theory is that it only requires that we believe in something very simple. An example of a theory with such a characteristic is the theory that the extinction of the dinosaurs was caused by an asteroid collision. Such a theory asks us only to believe in something very simple, merely that a big rock fell from space and hit our planet. Another example of a theory that meets this characteristic is the theory of global warming. In its most basic form, the theory asks us to merely believe in something very simple, that humans are putting more greenhouse gases in the atmosphere, and that such gases raise temperatures (as we know they do inside a greenhouse). But the cosmic inflation theory (the theory of primordial exponential expansion) does not have this simplicity characteristic. All versions of such a theory require complex special conditions in order for this cosmic inflation (exponential expansion) to begin, to last for only an instant, and then to end in less than a second so that the universe ends up with the type of expansion that it now has (linear expansion, not exponential expansion). We need merely look at the papers of the cosmic inflation theorists (all filled with complex mathematical speculations) to see that the theory fails very much to meet this simplicity characteristic of a good scientific theory. In a recent post, the cosmic inflation pitchman Ethan Siegel tells us, "If you have an inflationary Universe that's governed by quantum physics, a Multiverse is unavoidable." What that means is the cosmic inflation has the near-infinite baggage of requiring belief in some vast collection of universes. Of course, this is the exact opposite of the simplicity that is desirable in a good theory.
3. **There is no evidence conflicting with the theory.** A characteristic of a good scientific theory is that there is no evidence conflicting with the theory. The theory of electromagnetism and the theory of plate tectonics are very good theories, and there is no evidence against them. But there are quite a few observations conflicting with the cosmic inflation theory (the theory of exponential expansion in the universe's first instant). Such observations (sometimes called CMB anomalies) are discussed in this post. The observations are mainly cases in which the cosmic background radiation has some characteristic that we would not expect to see if the cosmic inflation theory were true. A scientific paper says, “These are therefore clearly surprising, highly statistically significant anomalies — unexpected in the standard inflationary theory and the accepted cosmological model.”
4. **The theory makes precise numerical predictions that have been exactly verified to several decimal**

places very many times. This characteristic is one that the best theories in physics have, theories such as the theory of general relativity, the theory of quantum mechanics, and the theory of electromagnetism. For example, the theory may predict that some unmeasured quantity will be 342.2304, and scientists will measure that quantity and find that it is exactly 342.2304. Or the theory may predict that some asteroid will hit the Moon on exactly 10:30 PM EST on May 23, 2026, and it will then be found (10 days later) that the asteroid did hit the Moon on exactly 10:30 PM EST on May 23, 2026. The cosmic inflation theory does not have this characteristic of a good scientific theory. It makes no exact numerical predictions at all. There have been published several hundred different versions of the cosmic inflation theory, each of which is a different scientific model. Each of those hundreds of models can predict 1000 different things, because the numerical parameters used with the equations can be varied. So the predictions of the cosmic inflation theory are pretty much all over the map, and it is impossible to point to any case in which it made a good precise successful prediction. When advocates of the cosmic inflation theory talk about predictive success, they are talking about woolly kind of predictions (like "the universe will be pretty flat") rather than exact numerical predictions, and they are talking about one-shot affairs rather than cases in which predictions are repeatedly verified. Many a wrong theory can have an equal degree of predictive success. For example, a bad economic theory may predict various things, and may vaguely predict correctly that the stock market will go up next year.

5. **We continue to get observational signs that the theory is correct.** A desirable characteristic of a good scientific theory is that we continue to observe signs suggesting that theory is correct. The theory of plate tectonics has such a characteristic. Every time there is an earthquake in the "Ring of Fire" region that marks the boundaries of continental plates, that's an additional observational sign that the plate tectonics theory is correct. The theory of gravitation continues to send us observational signals every day that the theory is correct. But we do not get any observational signs from the universe that it once underwent an instant of exponential expansion, nor can we logically imagine how such signs could ever come or keep coming from such a primordial event.

So it is clear that Martin's claim that the theory of cosmic inflation has "all of the criterions that a good scientific theory should possess" is not at all true. Saying something similar to what I said above, a New Scientist article puts it this way:

But no measurement will rule out inflation entirely, because it doesn't make specific predictions. "There is a huge space of possible inflationary theories, which makes testing the basic idea very difficult," says Peter Coles at Cardiff University, UK. "It's like nailing jelly to the wall."

The tall tale of cosmic inflation (exponential expansion at the beginning of the universe) is a modern case of a tribal folktale, told by a small tribe of a few thousand cosmologists. Below is the basic piece of folklore of the cosmic inflation theory:

"At the very beginning, the universe started out with just the right conditions for it to start expanding at a super-fast exponential rate. So for the tiniest fraction of a second, the universe did expand at this explosive exponential rate. Then, BOOM, the universe suddenly switched gears, did a dramatic change, and started expanding at the much slower, linear rate that we now observe."

Why would anyone believe such a story that can never be verified? The answer is: because they have a strong motivation. The arguments given for the cosmic inflation theory are examples of what is called motivated reasoning. Motivated reasoning is reasoning that people engage in not because they have premises or evidence that demand particular conclusions, but because they have a motivation for reaching the conclusion.

The motivation for the cosmic inflation theory was that people wanted to get rid of some apparent fine-tuning in the Big Bang. At about the time the cosmic inflation theory appeared, scientists were saying that the universe's initial expansion rate was just right, and that if it had differed by less than 1 part in 1,000,000,000,000,000,000,000,000,000,000,000,000,000, we would not have ended up with a universe that would have allowed life to exist in it. That type of extremely precise fine-tuning at the very beginning of Time bothers those who want to believe in a purposeless universe.

Saying that the universe's initial expansion rate was fine-tuned is equivalent to saying that the density was fine-tuned, for the requirement is a very precise balancing involving an expansion rate that is just right for a particular density (or, to state the same idea, a density that is just right for a particular expansion rate). In a recent very long cosmology paper, scientist Fred Adams notes on page 41 the requirement for a very precise fine-tuning of the universe's initial density (something like 1 in 10 to the sixtieth power, which is a trillionth of a trillionth of a trillionth of a trillionth of a trillionth). On page 42 Adams states that, "The paradigm of inflation was developed to alleviate this issue of the sensitive fine-tuning of the density parameter." That was the motivation of the cosmic inflation theory -- to sweep under the rug or get rid of a dramatic case of fine-tuning in nature.

The folklore mongers who sell cosmic inflation stories may believe that they have got rid of this fine-tuning at the beginning. But they actually haven't. They've merely “robbed Peter to pay Paul,” by getting rid of fine-tuning in one place (in regard to the universe's initial expansion rate) at the price of requiring lots of fine-tuning in lots of other places. That's because all theories of cosmic inflation themselves require enormous amounts of fine-tuning. But with a cosmic inflation theory it may be rather less noticeable, because the required fine-tuning occurs in lots of different places rather than in one place.

Judging from a 2016 cosmology paper, the cosmic inflation theory requires not just one type of fine-tuning, but three types of fine-tuning. The paper says, “Provided one permits a reasonable amount of fine tuning (precisely three fine tunings are needed), one can get a flat enough effective potential in the Einstein frame to grant inflation whose predictions are consistent with observations.” How on Earth does it represent progress to try to get rid of one case of fine-tuning by introducing a theory that requires three cases of fine-tuning? And the estimate of three fine-tunings in the paper is probably an underestimate, as other papers I have read suggest that 7 or more precise fine-tunings are needed.

This is not theoretical progress

We may compare the cosmic inflation pitchman to some person who wants to sell someone in Manhattan a car. “Think of all the money you'll save!” says the pitchman. “You won't have to pay $40 on subways each week.” But what the pitchman fails to tell you is that when you add up the cost of the monthly car payments, the cost of car insurance, and the cost of a garage parking space (because there's so few parking spaces in Manhattan), the total cost of the car is much more than the cost of the subway. Similarly the pitchmen of cosmic inflation theory tell us that the theory is great because it reduces fine-tuning in one place (in regard to the universe's initial expansion rate), and neglect to tell you that the total amount of fine-tuning

(adding up all of the special requirements and fine-tuning needed for cosmic inflation to work) is probably far "worse" if you believe that cosmic inflation occurred.

What has been going on with the cosmic inflation theory is very similar to what went on for decades with the supersymmetry theory, a theory which physicists have been fruitlessly laboring on for decades. Like the cosmic inflation theory, supersymmetry was motivated by a desire to sweep under the rug some fine-tuning. In the case of supersymmetry, the fine-tuning scientists wanted to get rid of was the apparent fact of the Higgs boson or Higgs field being fine-tuned very precisely ("like a pencil standing on its point" is an analogy sometimes given). An article on the supersymmetry theory discusses the fine-tuning that motivated the theory:

One logical option is that nature has chosen the initial value of the Higgs boson mass to precisely offset these quantum fluctuations, to an accuracy of one in 10^{16}. However, that possibility seems remote at best, because the initial value and the quantum fluctuation have nothing to do with each other. It would be akin to dropping a sharp pencil onto a table and having it land exactly upright, balanced on its point. In physics terms, the configuration of the pencil is unnatural or fine-tuned.

Similarly, a paper on an MIT server entitled "Motivation for Supersymmetry" states the following (referring to the many new types of hypothetical particles called "supersymmetric partners" imagined by the supersymmetry theory):

Thus in order to get the required low Higgs mass, the bare mass must be fine-tuned to dozens of significant places in order to precisely cancel the very large interaction terms....However, if supersymmetric partners are included, this fine-tuning is not needed.

Physicists erected the ornate theory of supersymmetry, thinking that they were explaining away this very precise fine-tuning in nature, "to dozens of significant places." But they failed to see that they were just "robbing Peter to pay Paul," because the total amount of fine-tuning required by the supersymmetry theory (given all of its many different things that had to be just right) was as great as the fine-tuning that it tried to explain away. So there was no net lessening of fine-tuning even if the supersymmetry theory was true.

The MIT paper above says "many thousands" of science papers have been written about supersymmetry. Most of them spun out ornate webs of speculation, as ornate and unsubstantiated as the gossamer speculations of cosmic inflation theorists. Supersymmetry has failed all observational tests, and

now many physicists are lamenting that they wasted so many years on it. Our cosmic inflation theorists have failed to heed the lesson of the supersymmetry fiasco: that trying to explain away fine-tuning in the universe is a waste of time.

Postscript: A recent scientific article makes untrue comments about the supersymmetry theory. It amusingly claims that the theory is a "natural outgrowth of a mathematical symmetry of spacetime." There's nothing natural about the supersymmetry theory, which is a very complex artificial collection of ad-hoc speculations. The article tells us that the supersymmetry theory is "well established within particle physics," ignoring the fact that no evidence for the theory has ever appeared, and that it has failed all observational tests. This is what so many modern scientists and science writers do: make untrue claims about the evidence status of cherished theories.

A recent article in Scientific American says the following:

In the big "inflation debate" in Scientific American a few years ago, a key piece of the big bang paradigm was criticized by one of the theory's original proponents for having become indefensible as a scientific theory. Why? Because inflation theory relies on ad hoc contrivances to accommodate almost any data, and because its proposed physical field is not based on anything with empirical justification.

Posted by Mark Mahin at 8:55 AM No comments:

Labels: Big Bang, cosmic fine tuning, cosmic inflation, cosmology, physics, supersymmetry

Tuesday, September 25, 2018

Barash's Poor Logic on Cosmic Fine-Tuning

Our universe seems to be incredibly fine-tuned to allow the existence of biological organisms such as ourselves. Against all odds, the fundamental constants have values that allow the existence of long-lived stars, planets and living beings. Make minor changes in any of a dozen places in the universe's fundamental constants and laws, and observers such as us would be impossible.

An example (one of many discussed here) is the exact numerical equality of the absolute value of the proton charge and the electron charge. Given that each proton has a mass 1836 times greater than the mass of each electron, we would not at all expect these two fundamental particles to have electric charges that are exactly equal or exactly opposite. But according to modern science the electric charge of each electron in the universe is the exact opposite of the electric charge of each proton in the universe. The equality has been proven to be an exact match to at least 18 decimal places. We would not expect a

coincidence like this to occur in 1 in a trillion random universes. The scientist Greenstein has stated that if this coincidence did not exist, planets could not hold together, because the electromagnetic repulsion between particles in a planet would totally overwhelm the gravity that holds the planet together (electromagnetism being a fundamental force more than a trillion trillion trillion times stronger than gravitation).

In Aeon magazine we recently had an evolutionary biologist named David Barash do his best to sweep under the rug the gigantic reality of cosmic fine-tuning. His "Anthropic Arrogance" essay is a grab bag of points that do not add up to any forcible objection to claims such as, "Our universe shows life-favoring characteristics so fantastically improbable that we should suspect a grand purpose behind its physical reality."

Barash tries to raise doubt about the topic by quoting Einstein's statement "What really interests me is whether God had any choice in the creation of the world?" He states the following:

Note that Einstein was asking if the deep laws of physics might have in fact fixed the various physical constants of the Universe as the only values that they could possibly have, given the nature of reality, rather than having been ordained for some ultimate end – notably, us. At present, we simply don't know whether the way the world works is the only way it could; in short, whether currently identified laws and physical constants are somehow bound together, according to physical law, irrespective of whether human beings – or anything else – eventuated.

But it is not at all correct to claim that "we don't know whether the the way the world works is the only way it could." We do know exactly such a thing. We know, for example, that each proton has a mass 1836 times greater than each electron, and that the electric charge of each proton is the exact opposite of each electron. There is no *a priori* reason why such numbers could not have been totally different. And so it is with all of the fundamental constants of the universe. The hope occasionally expressed by physicists (that they might one day have a super-theory that explains all the fundamental constants and laws) is just a fantasy hope, kind of like some child saying, "One day I hope to own a marble mountain-top castle in Spain." There does not exist any theory showing why any of the fundamental constants could not have had a vastly different value. In the most unlikely event that physicists ever produce such a "this explains it all" theory, then appealing to such a thing may have some force; but until then, appealing to such a highly improbable possibility has no force.

Barash then resorts to a quite ridiculous argument sometimes made, that the universe isn't so fine-tuned for life because most of it is inhospitable to life. He says, "The stark truth is that

nearly all of it is incompatible with life – at least our carbon-based, water-dependent version of it." True, since the majority of the universe is just empty space. But anyone familiar with gravitation will know that you can't have a life-bearing planet without most of a solar system or galaxy being empty space. For example, if the space of the solar system mostly consisted of planets, the mass of such planets would exert so much gravitational force that the atmosphere of the earth would be pulled into space, and no one could breathe (not to mention that you'd be pulled out into outer space whenever you walked outside of your door).

Barash then resorts to a completely fallacious "extremely improbable things are very common" argument often made when materialists discuss cosmic fine-tuning. He points out that if you shuffle a set of cards, the chance of getting that exact sequence is something like 1 in 10 to the sixtieth power. Similarly, he reasons, if you strike a golf ball, there are trillions of different positions where the golf ball could end up, each extremely unlikely. Barash states, "For us to marvel at the fact of our existing (in a Universe that permits that existence) is comparable to a golf ball being amazed at the fact that it ended up wherever it did."

This type of reasoning is completely erroneous, for it commits the fallacy known as false analogy. The fallacy of false analogy is committed when you draw an analogy between two things that aren't similar. The reason why the average shuffled deck of cards is not comparable to a fine-tuned universe is that a fine-tuned universe is something that resembles a product of design, but a random deck of shuffled cards does not resemble a product of design. The reason why a randomly landed golf-ball is not comparable to a fine-tuned universe is that a fine-tuned universe is something that resembles a product of design, but a randomly landed golf ball does not resemble a product of design. It is therefore erroneous to claim that, "For us to marvel at the fact of our existing (in a Universe that permits that existence) is comparable to a golf ball being amazed at the fact that it ended up wherever it did" – for in the first case there is something that resembles design, and in the second case there isn't.

Barash continues the same witless reasoning by talking about the improbability of one particular sperm uniting with one particular egg to produce a baby. It's the same "extremely improbable things are very common" bad reasoning. He points out that since there are 150 million sperm in a man's ejaculation, it's very improbable that any one sperm would unite with an egg. This is also a false analogy, because all of those sperm are identical, so the uniting of one particular sperm with an egg does not resemble a product of design or even something terribly lucky. So it's a false analogy to compare such a thing

with a fine-tuned universe that seems to resemble a product of design and has all kinds of “lucky coincidences” all over the place.

Below is a conversation that illustrates the fallacious nature of the type of reasoning Barash uses in this case:

Son: Bye, Mom. I'm going to Las Vegas, and I will gamble my college fund at the roulette table, continuing to bet all my winnings until I become a billionaire.
Mom: That's crazy – you're all but certain to lose it all.
Son: But Mom, haven't you heard that very improbable things often happen? Why, if I shuffle this deck of cards, the chance of getting that particular sequence of cards is one in a gazillion. So my chance of winning the billion isn't so low.
Mom: You silly goose! Only run-of-the-mill, humdrum improbable things happen all the time. Extremely lucky random events don't happen often.

The son's reasoning is entirely fallacious, because while there very often happens very improbable outcomes that are not lucky and do not resemble the product of design, it is extremely rare and unlikely to have a random outcome resemble a product of design. So the chances of him winning the billion is every bit as low as his mother thinks.

Barash then asks two rhetorical questions about an asteroid collision millions of years ago, and I may note that such questions do nothing to advance his case.

Barash then appeals to the possibility of the multiverse as an explanation for cosmic fine-tuning, the idea that there are a large number of other universes. The fallacy of such an appeal is discussed in detail in this post, in which I give six reasons why such an appeal is fallacious. The best reason for rejecting the multiverse as an explanation for cosmic fine-tuning is the simple fact that you do not increase the likelihood of any one random trial being successful if you increase the number of random trials. For example, your chance of winning a million dollars in a weekend at Las Vegas is exactly the same regardless of whether or not there are an infinity of universes filled with gamblers who gamble at casinos. So whether or not there are a vast number of other universes has no effect on the probability of our universe being accidentally habitable. If there are a sufficient number of improbable coincidences, adding up very forcibly to an appearance of design, we should suspect such design if we think there is only one universe; and we should suspect such design with exactly the same force if we think there are many other universes.

Bad reasoning about your chances at Las Vegas

Barash then has a long paragraph building on the statement, “Shanks suggests that the multiverse hypothesis ‘does to the anthropic Universe what Copernicus’s heliocentric hypothesis did to the cosmological vision of the Earth as a fixed centre of the Universe’.” In the paragraph he drops the names of Galileo, Kepler and Copernicus. But it's not an appropriate comparison, because the conclusions of Galileo, Kepler, and Copernicus were based on observations, and there are zero observations of any other universe. What we have going on here is the same rhetorical trick that I discuss in my post “When Scientific Theorists Use 'Prestige by Association' Ploys.” Barash is trying to give some credibility to the groundless notion of the multiverse by trying to draw a very strained association between the multiverse and the hallowed scientific names of Galileo, Kepler and Copernicus. We shouldn't be fooled by such a maneuver.

Barash then appeals to the possibility of extraterrestrial life-forms that can get by on conditions much worse than we have. But this possibility does nothing to weaken the case for cosmic fine-tuning. I can give an analogy to explain why. If I come to a log cabin in the woods, I may reason that it's too improbable that such a house could have appeared by a chance arrangement of falling logs, and that the house is probably the product of design. If you were there with me, you might say, “That's not true because an organism could have just used a lucky tree hollow as its home.” But that does nothing to defeat my argument. Similarly, if its incredibly improbable that long-lived stable sun-like stars could exist in a random universe (and it is for the reasons discussed here), the existence of conditions that

allow such stars strengthens the case for cosmic fine-tuning, regardless of whether some organism could barely get by living on planets revolving around stars that are less favorable for life, such as a star that periodically zaps its planets with high doses of radiation.

Barash then refers us to Lee Smolin's groundless speculation that attempted to combine the idea of natural selection with some weird speculation that collapsing black holes spit out baby universes. This wildly imaginative theory, known as the theory of cosmological natural selection, has not been widely accepted by physicists. We know of no evidence at all that black holes spit out new universes. And since universes don't have genes, and don't mate with other universes, it is preposterous for Smolin to be claiming that natural selection might come into play on the level of universes. Even if it were true that black holes did spawn child universes, this would do nothing to explain the fine-tuned characteristics of our universe, for the same reason that natural selection on planet Earth does not explain the appearance of very complex visible biological innovations (contrary to the claims of those like Barash).

The reason is the same in both cases: the fact that natural selection cannot occur in regard to some particular innovation until after that innovation appears. We cannot explain the appearance of something like a vision system in organisms by saying that such an innovation improved their survival and reproduction rate, because such an improvement (the same as a degree of natural selection) would not occur until after such a biological innovation first appeared; and a consequence that follows something is never the cause of that thing. For similar reasons, natural selection could not be the cause of some universe being fine-tuned. The idea of yanking natural selection from the biological world and trying to fit it into the vastly different world of cosmology makes no more sense than trying to apply Freudian psychology to a discussion of colliding subatomic particles.

Next in Barash's essay he reminds us of the very surprising fact that at the end of Carl Sagan's novel *Contact*, scientists found that after computing pi (the ratio of the circumference of the circle to its radius) to many additional digits, the scientists found a gigantic circle embedded within the digits of pi. In Sagan's novel this discovery is treated as proof that the universe had a designer. This ending was omitted from the movie of *Contact*. I'm not sure why Barash is bringing this up. Perhaps he is trying to suggest that scientists finding something suggesting the universe is designed belongs only in fiction. But it suggests that this very influential scientist (Sagan) was not too averse to such a possibility, so it does nothing to help the case Barash is trying to make.

In his last paragraph Barash builds on his previous attempts to associate the idea of cosmic fine-tuning with a claim that humans are the center of the universe, or that the universe was designed for humans. But there is no necessary association between the two, and few people promoting the idea of cosmic fine-tuning claim that the universe was designed for humans specifically, preferring the more general idea that the universe may have been designed for intelligent observers. So in this regard Barash is attacking a straw man. Someone can believe that the universe was designed for life, and that there are numerous different types of intelligent life forms scattered across the universe. You can believe that without believing that humans are unique, and without believing that humans are the most advanced biological organisms, and without believing that humans are the centerpiece of the universe.

So you may have Copernican-style objections about humans being the centerpiece of the universe, but that does nothing to defeat or discredit the idea of cosmic fine-tuning. Whether the universe was fine-tuned for living observers, and whether man is the center of the universe or the most advanced organism in the universe are two entirely different questions. The title of Barash's essay is “Anthropic Arrogance.” But there is nothing arrogant at all about noticing a long series of extremely lucky coincidences and favorable facets of the universe's fundamental constants and laws, and suspecting that more than mere chance is involved.

After noticing the fallacy-ridden reasoning of evolutionary biologist Barash on this topic of the universe's fine-tuned physics, we should ask: in what other places have evolutionary biologists got away with fallacious reasoning? We should then go back and scrutinize their more doubtful statements, such as claims that vastly complex functional systems such as vision systems (more complex than a smartphone) can be explained by saying that they appeared because of accumulations of random mutations, a kind of “stuff piles up” explanation as vacuous as the explanation of “stuff happens.”

Posted by Mark Mahin at 10:39 AM No comments:

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Friday, August 24, 2018

More Poor Answers at the "Ask Philosophers" Site

The "Ask Philosophers" website (www.askphilosophers.org) is a site that consists of questions submitted by the public, with answers given by philosophers. No doubt there is much wisdom to be found at this site, although I found quite a few answers that were poor or illogical – such as the ones listed in my previous post. Below are some more examples.

Question 464 is an excellent and concise question: "Is it more probable that a universe that looks designed is created by a designer than by random natural forces?" In reply to this question, Stanford philosopher Mark Crimmins gives a long answer that is poor indeed. He tries to argue that it is hard to exactly calculate just precisely how improbable it might be that a universe was designed, no matter what characteristics it had. Using the term "designy-ness" to apparently mean "resembling something designed," Crimmins then states, "the mere 'designy-ness' of our universe is not by itself a good reason for confidence that it was designed."

This doesn't make sense. If we find ourselves in a garden that appears to be designed, with 50 neat, even rows of flowers, that certainly is a good reason for confidence that the garden was designed. If we find ourselves in a structure that appears to be designed, with nice even walls, nice even floors and a nice convenient roof, that certainly is a good reason for confidence that such a structure was designed. And if we find ourselves against enormous odds in a universe with many laws favoring our existence, and with many fundamental constants that have just the right values allowing us to exist, this "designy-ness" would seem to be a good reason for confidence that such a universe was designed. If you wish to escape such a conclusion, your only hope would be to somehow specify some plausible theory as to how a universe might accidentally have such favorable characteristics by chance or by natural factors. It is illogical to argue, as Crimmins has, that the appearance of design in a universe is no basis for confidence that it is designed. I may note that confidence (which may be defined as

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▶ July (8)
▶ June (8)
▶ May (8)
▶ April (8)
▶ March (9)

thinking something is likely true) has lower evidence requirements than certainty.

As for his "it's too hard to make an exact calculation of the probability" type of reasoning, anyone can defeat that by giving some simple examples. If I come to your backyard, and see a house of cards on the back porch, I can have great confidence that such a thing is the product of design rather than chance, even though I cannot calculate precisely how unlikely it might be that someone might throw a deck of cards into the air, and for a house of cards to then appear. And if I see a log cabin house in the woods, I can have very great confidence that such a thing is a product of design, even though I cannot exactly calculate how improbable it might be that falling trees in the woods would randomly form into a log cabin.

In question 24743, someone asks the question, "How can a certain bunch of atoms be more self aware than another bunch?" The question is a very good one. We can imagine a shoe box that has exactly the same element abundances of the human brain, with the same number of grams of carbon, the same number of grams of oxygen, and so forth. How could a human brain with the same abundances of elements produce consciousness, when the atoms in the shoe box do not? We can't plausibly answer the question by saying that there is some particular arrangement of the atoms that produces self-awareness.

Let us imagine some machine that rearranges every 10 minutes the element abundances in the human brain, producing a different combination of positions for these atoms every ten minutes. It seems to make no sense to think that the machine might run for a million years and not produce any self-awareness, and that suddenly some particular combination of these atoms would suddenly produce self-awareness.

The answer to this question given by philosopher Stephen Maitzen is a poor one. He merely says, "There's good evidence that the answer has to do with whether a given bunch of atoms composes a being that possesses a complex network of neurons." There is no such evidence. No one has the slightest idea of how neurons or a network of neurons could produce self-awareness. If you try to suggest that somehow the fact of all of the atoms being connected produces self-awareness, we can point out that according to such reasoning the connected atoms in a crystal lattice should be self-aware, or the densely packed and connected vines in the Amazon forest should be self-aware.

A good answer to question 24743 is to say that there is no obvious reason why one set of atoms in a brain would be more self-aware than any other set of atoms with the same abundances of elements, and that such a thing is one of many reasons for thinking that our self-awareness does not come

- February (7)
- January (8)

- 2019 (95)
- 2018 (93)
- 2017 (92)
- 2016 (92)
- 2015 (97)
- 2014 (163)
- 2013 (166)

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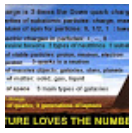
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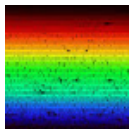
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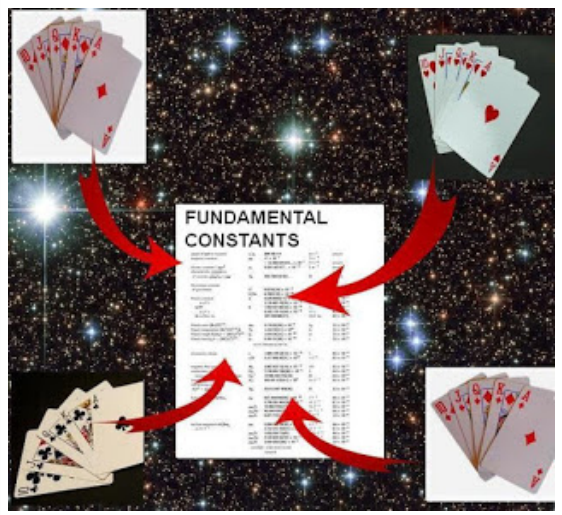
from our brains, but from some deeper reality, probably a spiritual reality.

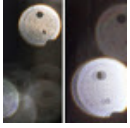
In question 4922, someone asks about the anthropic principle, asking whether it is a tautology, or "is there something more substantive behind it." The anthropic principle (sometimes defined as the principle that the universe must have characteristics that allow observers to exist in it) is a principle that was evoked after scientists discovered more and more cases of cosmic fine-tuning, cases in which our universe has immensely improbable characteristics necessary for living beings to exist in it. You can find many examples of these cases of cosmic fine-tuning by doing a Google search using either the phrase "anthropic principle" or "cosmic fine-tuning," or reading this post or this post.

The answer given to question 4922 by philosopher Nicholas D. Smith is a poor one. Smith says the anthropic principle "strikes me as neither a tautology nor as something that has anything 'more substantive behind it.' " Whether we can derive any principle like the anthropic principle from the many cases of cosmic fine-tuning is debatable, but clearly there is something enormously substantive that has triggered discussions of the anthropic principle. That something is the fact of cosmic fine-tuning. If our universe has many cases of having just the right characteristics, characteristics fantastically unlikely for a random universe to have, that philosophically is a very big deal, and one of the most important things scientists have ever discovered – not something that can be dismissed as lacking in substance.



Against all odds, our universe got many "royal flushes"

In question 40, someone asks a classic philosophical question: "Why does anything exist?" The questioner says, "Wouldn't it be more believable if nothing existed?" The answer to this question given by philosopher Jay L. Garfield is a poor one. After suggesting that the questioner read a book by Wittgenstein (the last thing anyone should do for insight on such a matter), Garfield merely suggests that the question "might not really be a



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real question at all." That's hardly a decent answer to such a question.

An intelligent response to the question of "why is there something rather than nothing" would be one that acknowledged why the question is an extremely natural one and a very substantive question indeed. It is indeed baffling why anything exists. Imagining a counter-factual, we can imagine a universe with no matter, no energy, no minds, and no God. In fact, such a state of existence would be the simplest possible state of existence. And we are tempted to regard such a simplest-possible state of existence as being the most plausible state of existence imaginable, for if there were eternal nothingness there would be zero problems of explaining why reality is the way it is. We can kind of get a hint as to a possible solution to the problem of existence, that it might be solved by supposing an ultimate reality the existence of which was necessary rather than contingent. But with our limited minds, we probably cannot figure out a full and final answer as to why there is something rather than nothing. We have strong reason to suspect, however, that if you fully understood why there is something rather than nothing, you would have the answer to many other age-old questions.

In question 3363, a person very intelligently states the following:

When I think about the organic lump of brain in my head understanding the universe, or anything at all, it seems absurdly unlikely. That lump of tissue seems to me more like a pancreas than a super-computer, and I have a hard time understanding how organic tissue is able to reach conclusions about the universe or existence.

We get an answer from philosopher Allen Stairs, but only a poor one. Stairs claims, "Neuroscientists will be able to tell you in a good deal of detail why the brain is better suited to computing than the pancreas is." This statement implies that neuroscientists have some idea of how it is than a brain can think or create ideas or generate understanding of abstract concepts. They have no such thing. As discussed here, no neuroscientist has ever given a remotely persuasive explanation as to how a brain could understand anything or generate an idea or engage in abstract reasoning. A good answer to question 3363 would have commended the person raising the question, saying that he has raised a very good point that has still not been answered, and has at least brought attention to an important shortcoming of modern neuroscience.
Philosophically the point raised by question 3363 is a very important one. The lack of any coherent understanding as to how neurons could produce mental phenomena such as consciousness, understanding and ideas is one of the major reasons for rejecting the idea that the mind is purely or mainly

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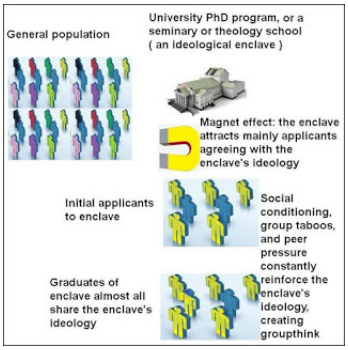
Why a Clique of Scientists Might Do Worse at Judging Truth Than a Jury

When newly awarded PhD's start writing papers and books and judging truth, they are rather like jurors who have been methodically expos...



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- 3D printing (1)
- abundance (1)
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the product of the brain. Many other reasons are discussed at this site.

In question 4165 a person raises the topic of near-death experiences, and asks whether philosophy has an opinion on this type of experience. The answer we get from Allen Stairs is a poor one. He attempts to argue that "it's not clear that it would do much to support the idea that the mind is separate from the body," even if someone reported floating out of his body and seeing some information that was taped to the top of a tall object, information he should have been unable to see from an operating table. This opinion makes no sense. Such evidence would indeed do much to support the idea that the mind is separate from the body. This type of evidence has already been gathered; see here for some dramatic cases similar to what the questioner discussed (verified information that someone acquired during a near-death experience, even though it should have been impossible for him to have acquired such information through normal sensory experience).

Stairs states the following to try and support his strange claim that people repeatedly reporting floating out of their bodies does not support the idea that the mind is separate from the brain:

How would that work? Does the bodiless mind have eyes? How did the interaction between whatever was up there on top of that tall object and the disembodied mind work? How did the information get stored? How did the mind reconnect with the patient's brain? The point isn't that the mind must be embodied. The point is that a case like this would only amount to good evidence for minds separate from bodies if that idea gave us a good explanation for the case. As it stands, it's not clear that it gives us much of an explanation at all, let the best one.

Stairs seems to be appealing here to a kind of principle that something isn't an explanation if it raises unanswered questions. That is not a sound principle at all, and in general in the history of science we find that important explanations usually raise many unanswered questions. For example, if we were to explain the rotation speeds of stars around the center of the galaxy by the explanation of dark matter, as many astrophysicists like to do, that raises quite a few unanswered questions, such as what type of particle dark matter is made up of, and how dark matter interacts with ordinary matter.

As for Stair's insinuation that postulating a mind or soul separate from the body is "not much of an explanation at all," that's not at all true. By postulating such a thing, it would seem that we can explain many things all at once. By postulating a soul as a repository of our memories, we can explain why people are able to remember things for 50 years, despite the very rapid

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

protein turnover in synapses which should prevent brains from storing memories for longer than a few weeks. By postulating a soul as a repository of our memories, we can explain why humans are able to instantly recall old and obscure memories, something that cannot be plausibly explained with the idea that memories are stored in brains (which creates a most severe "how could a brain instantly find a needle in a haystack" problem discussed here). By postulating a soul as the source of our intelligence, we can explain the fact (discussed here) that epileptic children who have hemispherectomy operations (the surgical removal of half of their brains) suffer only slight decreases in IQ, or none at all. By postulating a soul, we can explain how humans score at a 32 percent accuracy on ganzfeld ESP tests in which the expected chance result is only 25 percent (ESP being quite compatible with the idea of a soul). And by postulating a soul apart from our body, we can explain why so many people have near-death experiences in which they report their consciousness moving out of their bodies. So far from being "not much of an explanation at all" as Stairs suggests, by postulating a soul separate from the body, it would seem that we can explain quite a few things in one fell swoop.

Posted by Mark Mahin at 9:33 AM No comments:

Labels: anthropic principle, cosmic fine tuning, philosophy

Thursday, June 21, 2018

They Wanted an Accidental Universe, Not a Beautiful One

An article in the New York Times discusses the failure of attempts to find evidence for the physics theory called supersymmetry:

"These are difficult times for the theorists," Gian Giudice, the head of CERN's theory department, said. "Our hopes seem to have been shattered. We have not found what we wanted." What the world's physicists have wanted for almost 30 years is any sign of phenomena called supersymmetry, which has hovered just out of reach like a golden apple, a promise of a hidden mathematical beauty at the core of reality.

Physicist Sabine Hossenfelder (who blogs at the Backreaction blog) has written a recently published book entitled *Lost in Math: How Beauty Leads Physics Astray*. In the book she pushes the same claim she has advanced on her blog, that physicists have gone astray because they've been so interested in pushing theories describing some undiscovered underlying beauty in nature. The short summary of the book at the site offering it for sale includes this statement: "The belief in beauty has become so dogmatic that it now conflicts with scientific objectivity: observation has been unable to confirm mindboggling theories, like supersymmetry or grand

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

unification, invented by physicists based on aesthetic criteria." You can read an excerpt from the book here. In that excerpt she states "*Lost in Math* is the story of how aesthetic judgment drives contemporary research." She quotes a physicist to back up this claim:

"We cannot give exact mathematical rules that define if a theory is attractive or not," says Gian Francesco Giudice. "However, it is surprising how the beauty and elegance of a theory are universally recognized by people from different cultures. When I tell you, 'Look, I have a new paper and my theory is beautiful,' I don't have to tell you the details of my theory; you will get why I'm excited. Right?" ...."Most of the time it's a gut feeling," he says, "nothing that you can measure in mathematical terms: it is what one calls physical intuition. There is an important difference between how physicists and mathematicians see beauty. It's the right combination between explaining empirical facts and using fundamental principles that makes a physical theory successful and beautiful."

But though this particular quote might seem to back up her thesis, Hossenfelder's "quest for beauty" thesis seems to be a dubious one in the sense that it does not accurately describe why physicists spent so much time on unsuccessful efforts such as the theory of supersymmetry. I think the real story is: they wanted an accidental universe, not a beautiful one.

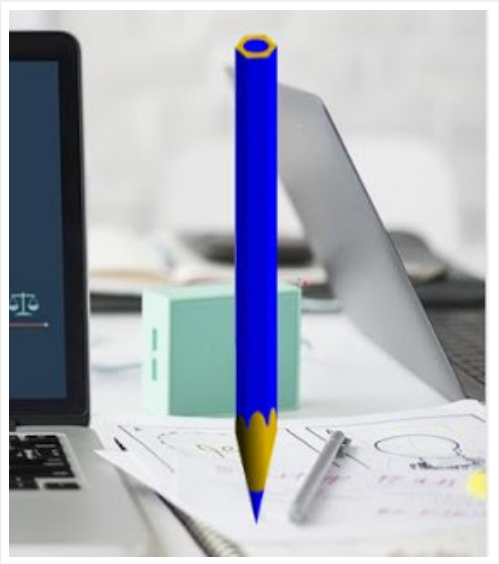
You can get a better feel for the motivation for a theory such as supersymmetry by reading a recent glum essay at the Aeon site, one entitled "Going nowhere fast." The essay states the following:

Behind the question of mass, an even bigger and uglier problem was lurking in the background of the Standard Model: why is the Higgs boson so light? In experiments it weighed in at 125 times the mass of a proton. But calculations using the theory implied that it should be much bigger – roughly ten million billion times bigger, in fact....Quantum fluctuations of ultra-heavy particle pairs should have a profound effect on the Higgs boson, whose mass is very sensitive to them....One logical option is that nature has chosen the initial value of the Higgs boson mass to precisely offset these quantum fluctuations, to an accuracy of one in 10^{16}. *However, that possibility seems remote at best, because the initial value and the quantum fluctuation have nothing to do with each other. It would be akin to dropping a sharp pencil onto a table and having it land exactly upright, balanced on its point. In physics terms, the configuration of the pencil is unnatural or fine-tuned. Just as the movement of air or tiny vibrations should make the pencil fall over, the mass of the Higgs shouldn't be so perfectly calibrated that it has the ability to cancel out quantum fluctuations. However, instead of an uncanny correspondence, maybe the naturalness problem with*

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

the Higgs boson could be explained away by a new, more foundational theory: supersymmetry.

This illuminating excerpt gives you the real scoop on supersymmetry. It was a theory designed to "explain away" a case of fine-tuning in nature, something that seemed as precise as a pencil balancing on its tip. Why would someone want to explain away such fine-tuning? It wouldn't be because they wanted to make things "more beautiful," for by removing such an elegant case of fine-tuning it would be like robbing nature of something impressive and beautiful. But people might wish to get rid of such a case of fine-tuning if they wanted the universe to seem more accidental, and less like some product of deliberate purpose.



The motivation of wanting to make the universe seem more accidental is something that can be called an ideological preference. Hossenfelder's book would have a more accurate subtitle if its subtitle was "How Ideological Preferences Lead Physics Astray" rather than "How Beauty Leads Physics Astray." The same ideological preferences have led countless physicists and cosmologists to write thousands of speculative papers writing about inflation theories designed to explain away fine-tuning at the universe's very beginning, fine-tuning that seems more precise than that involving the Higgs boson.

None of these attempts to explain away fine-tuning in nature has been empirically substantiated by confirming evidence. Another problem is that such theories do not actually reduce the amount of fine-tuning in nature – they merely "rob Peter to pay Paul" by reducing fine-tuning in one place at the cost of adding lots of fine-tuning in other places. For example, supersymmetry postulates lots of "superpartner" particles that happen to have masses and charges exactly the same as known particles, but if such coincidences happened in nature, each such coincidence would be an additional case of fine-tuning. Similarly, the

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

"cosmic inflation" theories of exponential expansion in the universe's first second get rid of some cases of fine-tuning, but require just as much or more fine-tuning in the form of lots of postulated parameters that have to be fine-tuned.

Another problem with any such attempt is that it will merely address one case of fine-tuning, when there is fine-tuning all over the place in both physics and biology. As the previously cited Aeon piece tells us:

Perhaps the bleakest sign of a flaw in present approaches to particle physics is that the naturalness problem isn't confined to the Higgs boson. Calculations tell us that the energy of empty space (inferred from cosmological measurements to be tiny) should be huge. This would make the outer reaches of the universe decelerate away from us, when in fact observations of certain distant supernovae suggest that the outer reaches of our universe are accelerating. Supersymmetry doesn't fix this conflict.

The writer fails to mention that this "huge" energy of empty space should also be sufficient to prevent our very existence, so we have in this matter one of the many "why are things so well-arranged so that we can exist" issues. There are countless other such fine-tuning issues in physics, as well as countless cases of fine-tuning in biology that are poorly explained by existing theories.

We may therefore compare the supersymmetry theorist to a person underneath a UFO swarm above him, who tries unsuccessfully to explain one UFO in the sky as being a swarm of bees that happened to have a disk shape, while failing to mention forty other UFO's in the same sky, some larger than the ones he tried to explain.

The author of the Aeon essay notes the effort he has put into chasing the "superpartners" of supersymmetry theory. He states:

For the first 20 years of my scientific career, I cut my teeth on figuring out ways to detect the presence of superpartners in LHC data. Now I've all but dropped it as a research topic.

Since undiscovered physics might take any of 1,000,000,000,000 different configurations, the scientist who assumes that the one unobserved configuration he dreamed up is actually going to appear is rather like some interstellar astronaut who makes a drawing of an extraterrestrial life form that he might see on a planet, and who then expects to see exactly that life form in front of him when he opens up the door of his landing craft.

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

Posted by Mark Mahin at 11:07 AM No comments:

Labels: cosmic fine tuning, supersymmetry

Thursday, May 17, 2018

Three Fallacies in This Week's "Multiverse News" Story

May 14, 2018 was another day showing that a good deal of what you read in the science news has little relation to fact. Besides some misleading neuroscience headlines I'll discuss in another post, there were news stories about some cosmological research. Fox News covered it with a headline of "Scientists believe alien life may exist in other universes after discovering a mysterious 'force.'" The "force" referred to is the cosmological constant, which was discovered to exist more than 25 years ago. So the implication of the headline (that some new force was recently discovered) is bunk. The Live Science site reported the same research as "Aliens May Well Exist in a Parallel Universe, New Studies Find." The Daily Mail reported the same research with the headline, "Our universe may be one of many with life."

The studies in question were actually "no real news" type of affairs. They considered what is called the cosmological constant or dark energy, which is basically the same as the vacuum energy density or the energy density of empty space. The studies found that in some other universe such a thing might be up to 300 times greater without ruling out life in such a universe. This is "no real news" in the sense that this was already known.

What we have in our universe is a vacuum energy density or cosmological constant that seems not quite zero but very close to zero. This means that the vacuum of space is very close to being devoid of energy. So it's hardly a surprise that you could multiply by a few hundred times this "very close to nothing" energy density of the vacuum, without affecting the universe's habitability.

But our science news media has distorted such studies, drawing unwarranted conclusions from them. For example, the Live Science story claimed this: "According to a new pair of studies in the journal Monthly Notices of the Royal Astronomical Society, there's a decent chance that life-fostering planets could exist in a parallel universe." I will now explain three fallacies involved in such claims, which certainly do not follow from the studies in question.

Fallacy 1: The Fallacy of Mistaking "Could Be Much Different Without Ruining Things" with "Being Likely to Be Life-Compatible"

Let us consider some particular parameter in a universe: for example, the strength of the gravitational constant. Imagine you show that such a parameter could vary by 100 times without ruining the chances of

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

life in our universe. Would such a parameter be likely to be compatible with life's existence in a random universe? Not at all. Whether a particular parameter could be much different without ruining a universe's habitability (call this Question A) is a much different question than whether such a parameter would be likely to have a value not ruining the chances of life in a random universe (call this Question B).

How can we calculate this Question B? You would have to numerically compare two ranges of values: (1) a range of values (call it Range A) that the parameter could have without preventing life in our universe; (2) a much larger set of values (call it Range B) that the parameter might possibly have had.

Let's try this in the case of the gravitational constant. We know that the universe has four fundamental forces (the gravitational force, the weak nuclear force, the electromagnetic force, and the strong nuclear force). We also know that the ratio between the strongest of the forces (the strong nuclear force) and the weakest of these forces (the gravitational force) is about 10 to the fortieth power or 10^{40}. So in estimating the set of values that any of these four forces might have had in a possible universe, a reasonable approach would be to assume that any of them might have varied by a factor of 10^{40}. So for the gravitational constant it would seem that Range B should be something like the range of values between a value 10^{40} times smaller than the current value of the gravitational constant and a value 10^{40} times larger than the current value of the gravitational constant. But in this case Range A would only be a microscopic fraction of this Range B, because there are reasons why life could not exist in our universe if the gravitational constant was much more than about 100 times larger or smaller.

The ratio between this Range A and Range B is actually about 1 in 10 to the thirty-seventh power. So in the case of the gravitational constant two things are true: (1) the current value of the constant could be no more than about a hundred times larger or smaller without ruining the universe's chance of life; (2) the chance of such luck in a random universe seems to be less than 1 in 10,000,000,000,000,000,000,000,000,000.

I can give an analogy. Imagine there's an office door that requires people entering to type their 10-digit social security number. Imagine there are 100 employees in the office. In this case there are 100 random numbers you can type that would get you inside the office. But there's still only a tiny chance of success with a random number. So you should not at all make the mistake of thinking, “There's a good chance of getting in; there are a hundred numbers that will get you in.” The chance of getting in with a random number is actually less than 1 in 100 million. And similarly, the chance of a random universe having a life-compatible gravitational constant is much less than 1 in a billion, even though there are multiple random values for such a constant that might be compatible with life.

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

In the case of the cosmological constant, we would have to consider both the Range A mentioned by these scientific papers (plus or minus 300 times) and also a vastly larger Range B representing possible values for the cosmological constant. The cosmological constant is determined by various quantum contributions to the vacuum energy density, and physicists have long told us that these contributions should be enormous. Calculations based on quantum mechanics indicate that the cosmological constant should actually be 10^{60} or 10^{120} times larger than it is. This is the problem (discussed here) called the "vacuum catastrophe" problem, the problem that reality is not matching theoretical predictions.

So the Range B for the cosmological constant should be any value between 0 and a value 10^{60} times stronger than its value in our universe. In a random universe the energy density of a vacuum could be anywhere between nothing and the energy density of a neutron star. In this case the Range A (a value between the cosmological constant's value in our universe and a value 300 times greater) is only a tiny fraction of the Range B – less than a millionth of a billionth.

So far from showing that "there's a decent chance that life-fostering planets could exist in a parallel universe," the very item being considered (the cosmological constant or vacuum energy density) is a reason for thinking that there would be less than one chance in a million billion of a random universe having properties compatible with life.

Fallacy 2: Assuming That a Universe's Habitability Depends On Only One Factor

The habitability of a universe depends on a very large number of factors, including all of these:

- the strength of the electromagnetic force
- the strength of the strong nuclear force binding atomic nuclei together
- the strength of the gravitational force
- the value of Planck's constant, a constant that appears very often in nuclear equations
- the value of the speed of light
- the extent of the vacuum energy density or cosmological constant
- the expansion speed of an expanding universe
- the ratio between the absolute value of the electric charge on the proton and the absolute value of the electric charge on the electron (very precisely 1.000000000000000 in our universe, as discussed here)
- the ratio between the mass of the proton and the mass of the electron
- the size of primordial density fluctuations

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

- suitable law of nature, such as those allowing electromagnetism
- the amount of entropy in the universe

All of these things have to be right for a universe to be habitable, for reasons discussed here and here. Below is a table listing some of the requirements for a universe to have civilizations (see here for a discussion of each item in the table). Click on the table to see it at better resolution.

Item	Requirements (Direct or Indirect)
Higgs field	Fine-tuning to 15 decimal places
Up quark, down quark, electrons	Currently unexplained matter/antimatter asymmetry, Higgs field
protons, neutrons	up quark, down quark
hydrogen atoms	protons, electrons, electromagnetic force
Galaxies	Fine-tuning of expansion rate, density perturbations, dark energy, dark matter, photon/baryon ratio, gravitation
carbon atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing carbon in stars
Oxygen atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing oxygen in stars, weak force
Heavier atoms (with more than about 25 protons)	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong force, weak nuclear force and neutrinos causing supernovae
Sunlike stars	Galaxies, fine-tuning of (1) gravitation (2) electron mass (3) Planck's constant (4) speed of light
water	Oxygen atoms, hydrogen atoms
Stable planets	Gravitation, equality of proton charge and electron charge to many decimal places (for planet to hold together)
Nucleotides	oxygen atoms, carbon atoms, molecular bonding requirements
Genetic code	Huge enigmatic requirement -- "programming code from chemicals"
RNA	Nucleotides, Genetic code, water
DNA	RNA, nucleotides, Genetic code, water
Proteins, cells	DNA, RNA, Genetic code, water
Photosynthesis	Exotic quantum effects
Civilizations near sunlike stars	Heavier atoms, sunlike stars, stable planets, proteins, cells, photosynthesis, important unknown other requirements allowing Mind to arise from matter

It is therefore a great fallacy for anyone to be hearing about some study regarding one particular cosmic parameter or fundamental constant, and then saying, "Oh, so it's not so hard for a universe to be habitable." That's rather like some young lady saying, "Okay, I've got a good hairstyle, now I've got a good chance of becoming a movie star." Just as becoming a movie star has many different requirements (such as looks, a good agent, lucky breaks, connections, and acting talent), having a universe compatible with life has many different requirements.

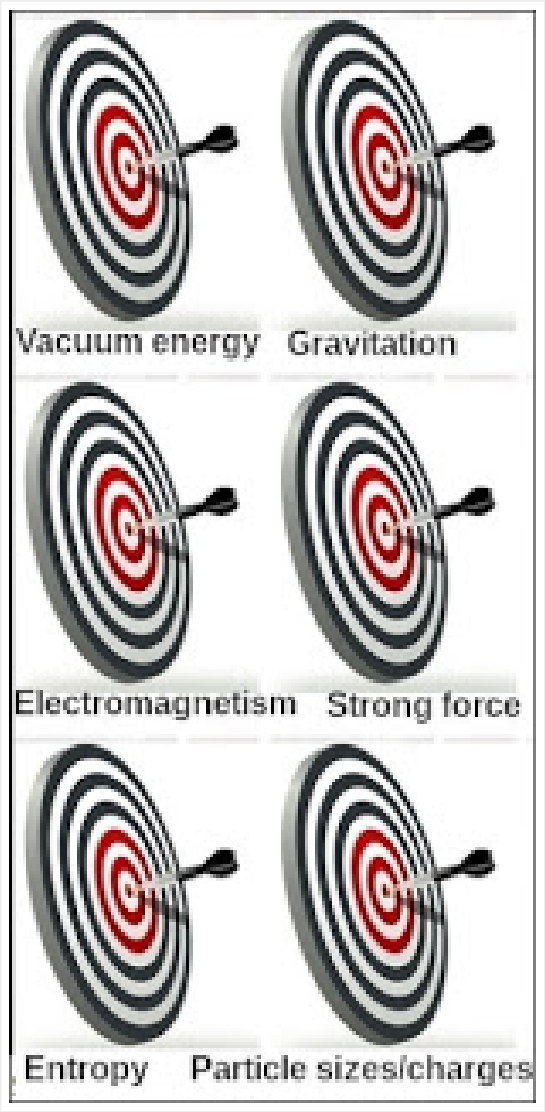
Fallacy 3: Assuming That a Habitable Universe Equals a Good Chance of a Planet with Intelligent Life

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

It is important not to confuse necessary conditions and sufficient conditions. A necessary condition is some condition that must be met in order for some thing to occur. A sufficient condition is something that will guarantee that such a thing will occur. For example, buying a lottery ticket is a necessary condition for winning a lottery jackpot, but not at all a sufficient condition for such a thing. Having your head cut off is not a necessary condition for death, but it is a sufficient condition for death, guaranteeing that someone will die.

In regard to the appearance of intelligent life on a planet, a habitable universe is a necessary condition for such an appearance, but not at all a sufficient condition for such a thing. Beyond the many conditions for a habitable universe, there are many *additional* conditions that must be met for life to get started in any universe: (1) the appearance of a genetic code; (2) the appearance at one spot of more than 100,000 base pairs achieving a functional end allowing a cell to reproduce; (3) the appearance of a molecule like DNA; (4) the appearance of a cell membrane. Then there are many additional improbable conditions that must be met for life to arise to the state of multicellular complexity and intelligence. These additional conditions are so steep that they might never occur in any of a million random universes, even if they all happened to be habitable.

There are many highly improbable conditions that must be met for any random universe to be either life-compatible or compatible with the existence of stars. For reasons discussed in this post, with overwhelming likelihood a random universe would be both lifeless and light-less. The bottom line on the cosmological constant or vacuum energy density is that it is one of many needles that must be threaded for you to have a universe compatible with life, one of many distant target bulls-eyes that must be hit to end up with a universe compatible with the existence of intelligent life.



Posted by Mark Mahin at 11:20 AM No comments:

Labels: cosmic fine tuning, cosmology, multiverse

Friday, December 15, 2017

Fake Physics Does Not Explain Real Cosmic Fine-Tuning

Marcus Du Sautoy is a mathematician who has taken over Richard Dawkin's chair as Charles Simonyi Professor for the Public Understanding of Science at Oxford University. While holding that chair, Dawkins committed many an error in reasoning, some of which are described here. Some equally bad errors of reasoning are committed in Du Sautoy's book *The Great Unknown*.

On page 221 Du Sautoy marvels at how fine-tuned the fundamental constants of our universe seem to be. He states:

What is particularly striking is how sensitive the possibility of life in our universe is to a small change in these constants. For example, if the constant that controls the way the electromagnetic field behaves in a vacuum is changed by four percent, then fusion in stars could not produce carbon....Change the cosmological constant in the 123rd

decimal place and suddenly it's impossible to have a habitable galaxy.

Du Sautoy suggests what he calls an "explanation" for this mystery – the idea of the multiverse, that there exists some vast collection of universes. He says, "In the multiverse model there are lots of different universes, and in each of these universes the fundamental constants could be randomly assigned." That is indeed the idea of the multiverse, although Du Sautoy misspeaks by referring to "the multiverse model." In science a model is a simplified representation of a known physical reality. Speculating about unknown or unobserved universes is not at all a case of making a scientific model.

Next Du Sautoy goes off the rails, both by the very fact of referring to the multiverse idea as an explanation, and also by claiming, most absurdly, that such an idea is a *simple* and *economical* explanation. He states the following on page 222:

The multiverse theory at least has that sense of economy we are after in a good theory. The explanation terminates and does not require further explanation. The addition of these other universes is just more of the same with variations, and once you accept all these other universes you get a complete solution to the fine-tuning problem....A good scientific theory should make sense of how everything is put together, and shouldn't need to introduce too many extra characters into the story to get the narrative we experience. There is a simplicity and naturalness about the multiverse theory that makes it a strong candidate theory.

Reading Du Sautoy claim that a multiverse is a simple explanation to the problem of why our universe is so fine-tuned, I am reminded of Voltaire's famous quip about the Holy Roman Empire: that it was neither holy nor Roman nor an empire. The multiverse is not at all an explanation and not at all simple. You present an explanation when you either discuss some causal factor that produced something, or you present some circumstances that allow you to say, "Now what seemed so surprising is not surprising." In neither of these senses is the multiverse idea an explanation. Imagining some vast collection of other universes does not involve some causal factor that preceded our universe, making it have fine-tuned constants. If we imagine such a vast collection of universes, it is still every bit as surprising that our particular universe should so improbably have fine-tuned characteristics it was so unlikely to have.

Imagine if some teenager buries all the furniture in his house in buckets of honey. You could try to explain this by claiming there is an infinity of other universes, and so in at least one such universe we would expect such behavior. But that is in no sense an explanation, because it does nothing to increase the likelihood that this particular teenager would have acted the

way he did. Our surprise about the teenager's behavior is not reduced, so in no sense has an explanation occurred. We can say the same thing about a multiverse as an attempted explanation for our universe's incredibly improbable fine-tuned constants. Imagining a multiverse does nothing to make it more likely that our particular universe would have such fine-tuned constants, so it is not correct to say that any explanation has occurred for our universe's characteristics.

Although he is a mathematician, Du Sautoy has ignored a mathematical rule very relevant to these considerations. The rule is that you do not increase the likelihood of a success on any one random trial no matter how much you increase the number of random trials. Each universe is like a random trial in which the success is the appearance of intelligent life. You do not increase the chance of success on any one trial by increasing the number of trials. So even if you assume an infinity of universes, that does not increase by even .0000000000000001 percent the likelihood that our particular universe would have coincidentally been consistent with life. And similarly, if I assume that there are an infinity of casinos, and an infinity of gamblers at such casinos, this does not increase by even .00000001 percent the likelihood that I will be a winner the next time I gamble at a casino.

As for Du Sautoy's claim that the multiverse idea is a simple and economical theory, this is certainly the exact opposite of the truth, for nothing could be less simple and less economical than imagining some vast collection of other universes, each with a different set of fundamental constants. Du Sautoy has previously told us that the cosmological constant seems to be fine-tuned to something like one part in 10 to the 123rd power. So his multiverse presumably needs to consist of more than 1,000,000,000,000,000,000,000,000,000,000,000,000,000,000, 000,000,000,000,000,000,000,000,000,000,000,000,000,0 00,000,000,000,000,000 universes. Calling a theory requiring such a thing simple and economical is every bit as fatuous as calling the Pacific Ocean “dry” or the Sahara Desert “wet.”

On page 223 Du Sautoy attempts to suggest that a multiverse theory is better than imagining a designer who fine-tuned the universe's constants, because “a designer who fine tunes the constants raises as many questions as it answers.” But, of course, exactly the same objection can be made to the infinite clutter of a multiverse, which raises far more questions than it answers, such as the question of where this vast collection of universes came from, and why all these universes happened to have the characteristics they have. And it is not a valid procedure to judge an explanation on whether it raises as many questions as it answers. All kinds of successful theories (such as the atomic theory) raised as many questions as they answered.

Du Sautoy suggests that a multiverse is a better explanation because it's not supernatural. But he's wrong – there's nothing more supernatural than a multiverse. The Merriam-Webster defines supernatural as “of or relating to an order of existence beyond the visible observable universe.” A vast collection of universes (each with different physical constants) outside of our universe is just such a thing.

On page 225, Du Sautoy states, “Although at the moment there is no way of testing the multiverse theory, there is no *a priori* reason why it will always remain untestable.” This is completely false; there is exactly such an *a priori* reason. It is the fact that we could never verify that there existed even one other universe with some set of physical constants different from our own.

On the same page, Du Sautoy states the following:

The multiverse theory, although potentially untestable, does come with a mechanism, inflation, by how these multiverses arise. And we do at least have evidence for one of these multiverses: our own universe.

The second statement is a clumsy misstatement, and the first statement is misleading. According to multiverse terminology, a multiverse is some collection of many individual universes. Our universe is therefore not a multiverse, but a universe. Our universe is no more evidence for a multiverse than a single tree is evidence for a forest.

As for the claim that inflation theory provides a mechanism for creating universes, this is not true in any relevant sense. Certain versions of the theory of cosmic inflation (itself a speculation designed mainly to explain evidence for a certain type of cosmic fine-tuning) imagine that our universe is kind of like a bubble in a larger cosmic reality that pops out bubble universes, kind of like a hot soup pops out bubbles. But this cosmic inflation theory has no mechanism for creating other universes with random physics and random physical constants. The “bubble universes” of the theory of eternal cosmic inflation should have the same physical constants as our universe. This point was

made by Columbia University multiverse critic Peter Woit, who states the following:

Claims are often made that the theory of inflation provides evidence for a multiverse with different physics in each universe. If one looks into actual models of inflation one finds that again, no theory of the sort has been claimed.

Woit reiterates the same point here, stating "models of inflation...are not models that lead to the kind of multiverse of different physical laws." Over the years, Woit's "Not Even Wrong" blog has been great about exposing the misstatements and malarkey of multiverse theorists. Woit now uses the term "Fake Physics" to describe such theories.

Moreover, since the cosmic inflation theory is a speculative theory for which there is no solid evidence, it can hardly be used to back up claims of a multiverse, no matter what it predicts or describes. Trying to do that is very much like a person trying to substantiate his claim of a vast horde of invisible fairies by saying that his other theory of a fourth-dimensional magic kingdom provides a mechanism for the appearance of such fairies. You do not substantiate one speculation by referring to another speculation.

Although perhaps sympathetic to his naturalism, Woit was scolding biologist Jerry Coyne, who recently had a post enthusing that maybe the multiverse can help us explain the appearance of human beings such as us. In a post with the misleading title "New evidence for the multiverse -- and its implications," Coyne states:

Further, it means that the evolution of humans was inevitable somewhere. In one of those universes that permitted the evolution of life, it was inevitable that a thinking hominin would evolve.

We may ask here: why does Coyne feel the need to drag in a multiverse (a vast collection of universes) to help explain the appearance of humans such as us? This is not at all what anyone should be doing if he felt that he had an adequate Darwinian explanation for human beings. On the other hand, someone who did not have an adequate Darwinian explanation for human beings might, in an act of utter desperation, try to imagine an infinity of universes to help explain human origins. But the problem is that exactly the same "it would happen at least once in an infinity of universes" reasoning can be used to justify a belief in fairies and leprechauns.

All these attempts to explain our universe's fine-tuned constants through imagining a vast collection of universes are guilty of a fallacy we may call the lucky numbers fallacy. This is the fallacy of assuming that some favorable set of physical constants would

be sufficient to make the universe habitable for beings such as us. Having favorable physical constants is a necessary condition for a habitable universe, but not a sufficient condition. You need something much more than such lucky numbers. For a universe to be habitable, you also need favorable laws of nature, which act programmatically to help create favorable conditions for life. Such laws act like intelligent programming. If there were an infinite set of random universes, we would not expect that any of them would have such a favorable set of laws like those in our universe. There would be no reason why any random universe would have laws resembling intelligent programming.

As for Coyne's idea that a multiverse might help explain humans, it is completely mistaken. Human minds have many characteristics that we cannot explain as being a result of natural selection or brain activity. As discussed here, human mental characteristics such as empathy, spirituality, mathematical ability, abstract thinking, musical ability, aesthetic appreciation, and artistic creativity are ones that do not have any survival benefit to organisms in the wild, so we cannot explain them by evoking natural selection. The most basic things such as consciousness and life-long memory cannot be explained by brain mechanisms. Besides having no plausible theory to explain human memories lasting for decades, scientists lack any explanation for how neurons could be producing human consciousness. Human minds have characteristics that can only be explained by imagining something beyond the brain: something such as soul or spirit. So no matter how many combinations of matter that might occur in an infinity of universes, not one single one of them would ever be sufficient to explain the human mind. You can't multiverse your way to explaining minds such as ours.

As shown in this post's table, we see many astonishing examples of fine-tuning both in the universe's laws and fundamental constants. We cannot explain away these things through infinitely extravagant multiverse speculations that Woit has recently labeled “Fake Physics.” Fake Physics does not explain real cosmic fine-tuning.

Posted by Mark Mahin at 11:53 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmology, fundamental constants, multiverse, scientific speculation

Tuesday, July 11, 2017

Cosmic Coincidence Cover-Up

In a recent post entitled “The Universe Itself May Be Unnatural,” cosmologist Ethan Siegel discusses some issues that he calls “coincidence problems.” He says, “If aspects of the Universe that should be very different turn out to be similar, we call this a "coincidence problem." He discusses some cosmic

coincidences, but neglects to discuss the most dramatic ones, including the "vacuum catastrophe" issue discussed here, and the issue I will discuss in this post: the coincidence of the proton charge being the exact opposite of the electron charge.

As many a scientist has admitted in recent decades, the fundamental constants of the universe are very fine-tuned to allow the existence of living creatures such as us, in the sense that there are quite a few "coincidences" required for our existence, lucky breaks that we needed and just happened to get. Any fully informative listing of the universe's fundamental constants should show at least one such coincidence, standing out very plain for the eye to see. Such a listing would look like this:

Fundamental Constants

Speed of light	299,792,458 meters per second
Planck's constant	$6.62607004 \times 10^{-34}$ m^2 kg / s
Gravitational constant	6.67408×10^{-11} m^3 kg^{-1} s^{-2}
Proton mass	$1.6726231 \times 10^{-27}$ kg
Electron mass	$9.1093897 \times 10^{-31}$ kg
Proton charge	$1.60217733 \times 10^{-19}$ coulomb
Electron charge	$-1.60217733 \times 10^{-19}$ coulomb

As we can see in this accurate listing, there is a great big coincidence. Even though each proton has a mass 1836 times greater than each electron, the charge of the proton is the exact opposite of the charge of the electron. An absolute magnitude is a number that you get when you discard the sign in front of the number. Experiments have actually indicated that the absolute magnitude of the proton charge and the absolute magnitude of the electron charge differ by less than 1 part in 1,000,000,000,000,000.

But if you do a Google search looking for listings of the fundamental constants of nature, you are not likely to notice this coincidence involving the proton charge and the electron charge. Why is that? It's because almost all of the tables of fundamental constants you will see will have concealed the coincidence.

Imagine some bank employee named John Wilson who each day is supposed to send out an email to his superiors entitled "Today's most important transactions." On a particular day such an email might honestly include the following:

Money we lost overnight in bank robbery: $1,345,239

Today's biggest deposit (to account of John Wilson): $1,345,239

Of course, this coincidence is very embarrassing to Mr. Wilson, as it suggests that the bank robbery was what they call an "inside job." So Wilson would no doubt arrange his table of "today's important transactions" so that it somehow covered up the coincidence. Similarly, almost always modern scientists creating a table of fundamental constants of the universe will arrange the table in such a way so that no one can notice any coincidence involving the charge of the electron and the proton. For they don't want anyone to think that the universe is something like "an inside job."

A convention is followed as to how this concealment is done. The convention is to avoid listing both the proton charge and the electron charge, and to list a single value that is called "the elementary charge." So the table of fundamental constants will look like this:

Fundamental Constants

Speed of light	299,792,458 meters per second
Planck's constant	$6.62607004 \times 10^{-34}$ m^2 kg / s
Gravitational constant	6.67408×10^{-11} m^3 kg^{-1} s^{-2}
Proton mass	$1.6726231 \times 10^{-27}$ kg
Electron mass	$9.1093897 \times 10^{-31}$ kg
Elementary charge	$1.60217733 \times 10^{-19}$ coulomb

This "elementary charge" is supposed to represent both the charge of the proton and the charge of the electron. Is it honest and accurate to be using such a term for both the positive charge of the proton and the negative charge of the electron? No, it isn't. Since the electron charge is negative and the proton charge is positive, it is misleading and inaccurate to use a single positive value to represent both of these things. It is as misleading as representing both a $1000 withdrawal and a $1000 deposit under a single line giving a positive number. For example, you would be misleading your mortgage lender if you withdrew $20,000 one day and then re-deposited it the same day, and then emailed your mortgage lender with a line such as this:

Today's bank activity: +20,000

The convention followed in tables of fundamental constants of listing both the proton charge and the electron charge under a single "elementary charge" line listing a positive value is therefore a deceptive concealment. It is a concealment because

it hides from us a fundamentally important fact that we should be informed about, that there is a huge coincidence in nature involving the proton charge being the exact opposite of the electron charge. The concealment is deceptive (in the sense of being literally inaccurate) in the sense that after looking at tables of fundamental constants that follow this convention, you will be left with the very inaccurate idea that the electron charge is positive.

Moreover, in physics the term “elementary” is used to mean something that cannot be reduced any further, as in the phrase “elementary particles” which refers to particles which cannot be subdivided any further. But we know that the proton charge is not even elementary in this sense. A proton is believed to consist of two Up quarks which each has a charge of 2/3 of the proton charge, and one Down quark which has a negative charge of 1/3 of the proton charge. So as the proton charge is not at all elementary, it is misleading to be listing it in a line labeled “elementary charge.”

There is quite a bit of talk in the news these days about obstruction of justice. What we have going on in the typical table of fundamental constants is what we can call an obstruction of learning. The person who bothered to view such a table should have been informed of the basic fact that the proton has a charge that is the exact opposite of the charge of the electron. Such a person is obstructed from learning this important fact by the typical table of fundamental constants, just as if the scientist creating the table was interested in covering up such a fact, and sweeping it under the rug.

The “elementary charge” concealment trick is used in many different physics references, but very rarely a physicist will let down his guard and “spill the beans.” That's what happens in the informative and entertaining new book *We Have No Idea* by physics professor Daniel Whiteson and Jorge Cham (which has many fun little cartoons which make it easier to read than a typical book on science). On page 54 the authors state this:

If the quarks had any more (or less charge), then the charge of protons wouldn't precisely balance the negative charge of the electron, and you couldn't form stable neutral atoms. Without these perfect -1/3 and + 2/3 charges, we wouldn't be here. There would be no chemistry, no biology and no life.

But is there any explanation for this? Apparently not, because the authors next state this:

This is actually fascinating (or creepy, depending on your level of paranoia) because, according to our current theory, particles can have any charges whatsoever; the theory works just as well with any charge value, and the fact they balance perfectly is, as far as we know, a huge and lucky coincidence.

It's not just one coincidence but two coincidences. The first coincidence is that the absolute magnitude of the charge of the Up quark is exactly twice the absolute magnitude of the Down quark. The second coincidence is that when you add up the charges in a proton (consisting of two Up quarks and one Down quark), you get a charge that is the exact opposite of the charge of the electron. As far as we can tell, these are separate coincidences, each with a likelihood no better than 1 in 1,000,000,000,000,000. The chance of both occurring in nature is like the odds of you correctly guessing the telephone numbers of two strangers, and then correctly the guessing the telephone numbers of the next two strangers you met.

The use of the word "creepy" in the quote above is interesting, as if the authors were afraid of learning about some contrivance in nature needed for their own existence. Would not "wondrous" be a more suitable adjective?

Postscript: The universe's fundamental constants are correctly listed at this page, one of the few listings that correctly has separate lines for the proton charge and the electron charge, using a positive sign for the proton charge and a negative sign for the electron charge.

Posted by Mark Mahin at 10:29 AM No comments:

Labels: cosmic fine tuning, electromagnetism

Sunday, June 25, 2017

Physicists Should Have Invested in Super Heroes Rather Than Supersymmetry

A recent article in the New York Times discusses the failure of attempts to find evidence for the physics theory called supersymmetry.

"These are difficult times for the theorists," Gian Giudice, the head of CERN's theory department, said. "Our hopes seem to have been shattered. We have not found what we wanted." What the world's

physicists have wanted for almost 30 years is any sign of phenomena called supersymmetry, which has hovered just out of reach like a golden apple, a promise of a hidden mathematical beauty at the core of reality.

The Standard Model of physics has fewer than 30 independent parameters. But according to one scientific web site, supersymmetry has more than 100 independent parameters. According to another page at the same web site, more than 10,000 scientific papers "reference" the theory of supersymmetry.

With all that work by physicists, you would think that there must be some evidence for supersymmetry. But efforts to find evidence for the theory have been a complete failure. The Large Hadron Collider has completely failed to support the theory.

Why have physicists spent so much time on such a theory? It was to try to explain a case in which nature seemed to be extraordinarily fine-tuned. The wikipedia article on supersymmetry states the following:

In the Standard Model, the electroweak scale receives enormous Planck-scale quantum corrections. The observed hierarchy between the electroweak scale and the Planck scale must be achieved with ***extraordinary fine tuning****. In a supersymmetric theory, on the other hand, Planck-scale quantum corrections cancel between partners and superpartners (owing to a minus sign associated with fermionic loops). The hierarchy between the electroweak scale and the Planck scale is achieved in a natural manner,* ***without miraculous fine-tuning****.*

The "miraculous fine-tuning" being talked about here (what is known as the hierarchy problem) is a kind of matching of two unrelated numbers so that they end up canceling each other out – rather like what you might have if you had to pay on Friday a $5000 payment to save your house from foreclosure, and you coincidentally won $5000 in the lottery on Friday morning.

But this hierarchy problem is actually much more of a coincidence. Because according to this scientific web site, "one has to hypothesize that the several correction terms cancel out to a part in 10^{34} (a hundred billionths of a billionth of a billionth of a billionth), if one is to make the Higgs mass smaller than a lead brick." So maybe our analogy should be that you own 6 houses that are each behind $5000 on the mortgage, with Friday being the last day for you to save them; and you coincidentally on Friday morning buy 6 different lottery tickets that each win $5000. That's the kind of fine-tuning that seems to be involved in the case of the hierarchy problem.

Supersymmetry (also known as SUSY) is an attempt to explain away this "miraculous fine-tuning." But supersymmetry has always been a ridiculously ornate contrivance. For example, it imagines that almost every known type of particle has a corresponding "superpartner." It would be quite the fantastic coincidence if nature was set up in such a way. So supersymmetry is basically a kind of gigantic case of "robbing Peter to pay Paul." It tries to get rid of one fine-tuned coincidence (the hierarchy problem) by introducing a whole bunch of other fine-tuned coincidences, involving all these cases in which a known type of particle happens to have a matching "superpartner" particle.

It's kind of the same approach taken by a similar theory, the theory of cosmic inflation or exponential expansion. That theory tries to get rid of a case of extreme fine-tuning in the universe's first second, but it does it by making assertions that require their own fine-tuning in numerous ways. So it's just robbing Peter to pay Paul. There is no real net reduction in the amount of fine-tuning required.

For years scientists were hoping that the Large Hadron Collider would produce some evidence for supersymmetry. But no evidence has been produced. The chance of supersymmetry being confirmed in our lifetimes now seems almost zero. That's no surprise. Supersymmetry is a case of trying to explain away an example of cosmic fine-tuning, and there has never been a confirmed success in any effort to explain away any case of cosmic fine-tuning. The cosmic inflation theory (the theory of exponential expansion in the universe's first second) has been sociologically successful, a case of a thought virus that spread widely. But it has not been scientifically successful, because no evidence has been produced for it (and there are many problems with the theory).

Rather than investing so much time and effort on supersymmetry, physicists would have got a lot better return if they had invested instead in *super heroes*. There are several ways physicists could have done that. The first way would have been to invest in physics technologies that might have given us high-tech gadgets that would allow someone to have the equivalent of a comic super-power. Physicists might have invented some fancy gadget that would give some of the powers of Batman's utility belt. Or they might have invested in some bullet-stopping force field that might have worked kind of like Wonder Woman's bracelets. Or physicists might have invested in some super-strong material that would give someone some of the powers of Spider Man or Iron Man.

Or, physicists could simply have invested in super heroes without doing any research. They could have taken all that money wasted on supersymmetry papers, and invested the money by either buying super hero comic books, or investing in companies such as Marvel that published comic books. Comic books have long been collector's items, and a comic book which sold for 12 cents back in the 1960's may sell for hundreds of dollars today. Disney paid 4 billion dollars for Marvel Entertainment. If physicists had invested in super hero comic books or the companies that published them, the physicists could have made gigantic returns for themselves or for the colleges or universities where they work.

I must confess that I myself am guilty of failing to see how much money could be made from comic books and from another collector's item:

baseball cards. When I lived in a dull Maryland suburb in the early 1960's, I had lots of comic books and many baseball cards. In the suburb I lived, elementary school students were preoccupied with baseball cards. The kids would gamble the cards in various ways, which made a fun pastime. One game worked like this: you would take your stack of cards, and face your friend who also had a stack of cards. After each of you shuffled your stack, both of you would deal them into a common stack. First you would deal a card, then your friend. If your friend dealt a card with one top color bar, and you then dealt a card on top of that stack with the same color bar, you would win the entire stack that had been dealt.

In my suburb it seemed every family with boys had a cardboard box of baseball cards. But when I was eleven I moved to a very different environment: the more sophisticated locale of Washington D.C. Of course, I packed my comic books and baseball cards, and I hoped the kids there would be as interested in these as the kids in my Maryland suburb. But it seemed that none of the Washington children had the slightest interest in baseball cards. And they didn't seem too interested in comic books. I kind of thought to myself: I guess the city kids are too sophisticated for these things – maybe they're just silly suburb things. So not very long after moving to Washington D.C, I threw away all my baseball cards and comic books. What a mistake! I could have made *thousands* if I had kept them.

Whether children at a particular school gamble with baseball cards is a sociological consideration, a vogue of a particular locale. When groundless theories such as supersymmetry become all the rage among little academic tribes, it seems to be also a sociological consideration, a case of some vogue that went viral when it shouldn't have.

Posted by Mark Mahin at 9:10 AM No comments:

Labels: cosmic fine tuning, supersymmetry

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Monday, June 5, 2017

Book Looks at the Universe's Many Royal Flushes

The fascinating question of cosmic fine-tuning has been given a very impressive and comprehensive treatment in the recent book *A Fortunate Universe: Life in a Finely Tuned Cosmos* by astrophysics professor Geraint F. Lewis and astronomy postdoctoral researcher Luke A. Barnes. The book looks at the many ways in which our universe seems to have improbably "hit the jackpot" or "won the lotto," having a series of incredibly lucky breaks that were necessary for our eventual existence. On page 29 the authors describe the thesis of a fine-tuned universe like this: "The claim is that small changes in the free parameters of the laws of nature as we know them have *dramatic, uncompensated,* and *detrimental* effects on the ability of the universe to support the complexity needed for physical life forms."

One case involves the existence of abundant carbon and oxygen in the universe, two elements that must exist in abundance for life to exist. Carbon and oxygen didn't exist in the early history of the universe, which was almost entirely hydrogen and helium. Carbon and oxygen were formed gradually by stars. A great deal of luck is required for any universe to be able to produce either carbon or oxygen; and for a universe to produce abundant amounts of *both* carbon and oxygen, some fantastically improbable strokes of luck are required. The authors note this on pages 118-119 (referring to the strong nuclear force that binds protons and neutrons in the nucleus of the atom):

If we nudge the strength of the strong force upwards by just 0.4 per cent, stars produce a wealth of carbon, but the route to oxygen is cut off. While we have the central element to support carbon-based life, the result is a universe in which there will be very little water. Decreasing the strength of the strong force by a similar 0.4 per cent has the opposite effect: all carbon is rapidly transformed into oxygen, providing the universe with plenty of water, but leaving it devoid of carbon.

Protons and neutrons are made up of smaller particles called quarks. A proton is made of two up quarks and one down quark, while a neutron is made of two down quarks and one up quark. On page 50 to 51 of the *Fortunate Universe* book, we are told some reasons why a life-

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bearing universe requires that these quark particles have masses not too far from the mass they have. If the down quark was about 70 times more massive or the up quark was about 130 times more massive, there would be only one element, and complex chemistry would be impossible. More sensitively, if the up quark was more than six times more massive, protons could not exist, and there would be no atoms. But later we learn of a much more sensitive requirement demanding that the quark masses be almost exactly as they are in order for the universe to be hospitable for life.

Reiterating the conclusions of this scientific paper, the book also notes on page 120 that we would not have a universe with abundant carbon and oxygen if the quark masses were different by much more than a few per cent. The book notes how improbable such a case of "hitting the distant bulls-eye" was:

And remember from last chapter that because the quarks are already "absurdly light" in the words of physicist Leonard Susskind, a range of mass that is a small percentage of their value in our Universe corresponds to a tiny fraction of their possible range. It is about one part in a million relative to the Higgs field, which gives them their mass. It is about one part in 10^{23} relative to the Planck mass!

On page 75 of the book we have a diagram that is basically the same as the diagram below from an article by one of the authors. The author shows that if you make random values for the strong nuclear force and a fundamental constant called the fine structure constant, then only a very tiny fraction will allow carbon-based life. Because the graph uses a logarithmic scale, it visually exaggerates the size of the tiny white rectangle. If you were to program a computer to assign random numbers for these two (the strong nuclear force and the fine structure constant) between 0 and 1000, less than one in a million times would the numbers end up within the tiny white rectangle.

► February (7)
► January (8)

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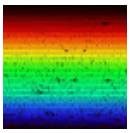
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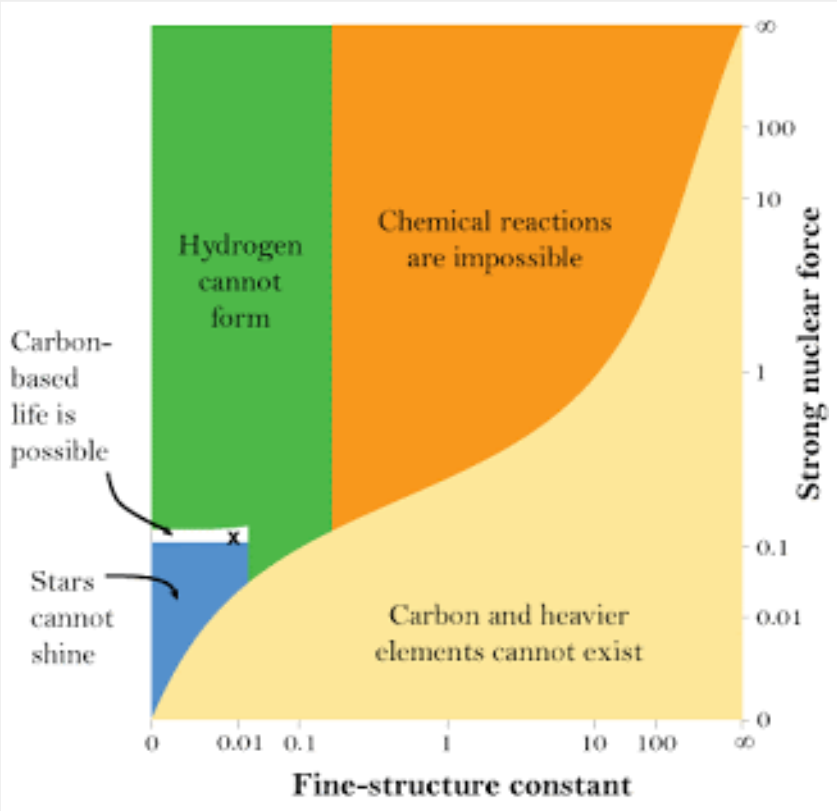


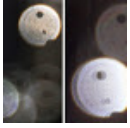
From Barnes article here

On page 63 the book has a discussion of fine-tuning involving the Higgs mass and Higgs boson:

Life requires a value not too much different to what we observe. There must be an as yet unknown mechanism that slices off the contributions from the quantum vacuum, reducing it down to the observed value. This slicing has to be done precisely, not too much and not so little as to destabilize the rest of particles. This is a cut as fine as one part in 10^{16}...This problem – known as the hierarchy problem – keeps particle physicists awake at night.

On page 111 of the book we are told about some ways in which the strong nuclear force is sensitive to changes:

A small decrease in the strength of the strong force by about 8 per cent would render deuterium unstable. A proton can no longer stick to a neutron, and the first *nuclear reaction in stars is in danger of falling apart. An increase of 12 per cent binds the diproton – a proton can stick to another proton. This gives stars a short cut, an easy way to burn fuel. If the diproton were suddenly bound within the Sun, it would burn hydrogen at a phenomenal rate, exhausting its fuel in mere moments.*



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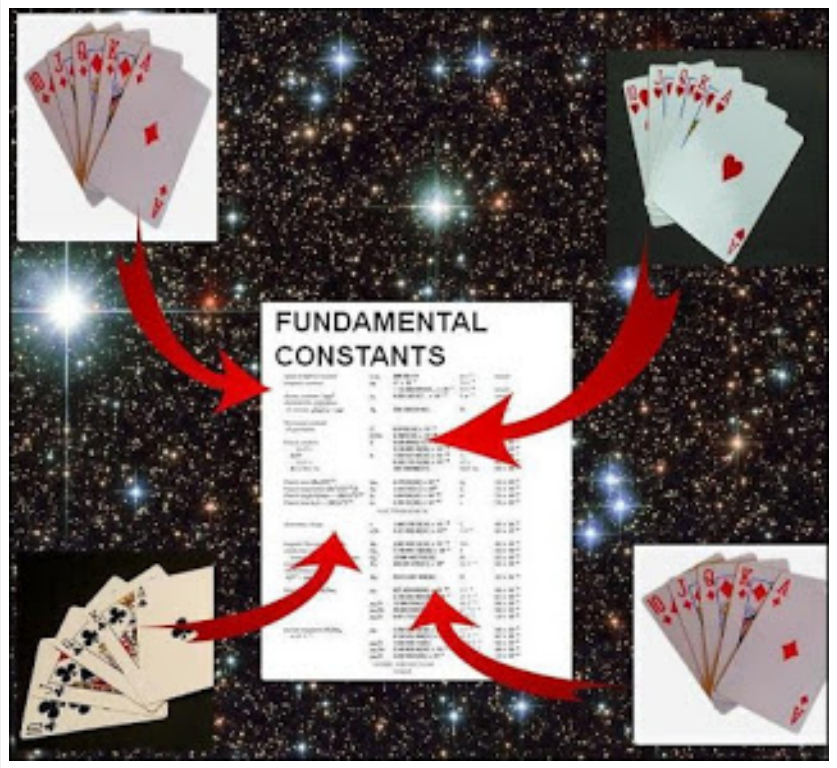

So many royal flushes

Then there is the cosmological constant problem, the case of fine-tuning discussed here. It's the issue that quantum field theory predicts that ordinary space should be very densely packed with quantum energy, making it even denser than steel. But somehow we live in a universe that has only the tiniest sliver of the vacuum density that it should have. Below is what page 162 of the book has to say about this:

Maybe there is a mechanism at work here, a mechanism that we clearly don't yet understand, which trims the energy in the quantum vacuum; so, while it is intrinsically very large, the value we observe, the value that influences the expansion of the universe, appears to be much, much smaller. But this would have to be a very precise razor, trimming off 10^{120} but leaving the apparently tiny amount that we observe....But what if this mechanism for suppressing the influence of the cosmic vacuum energy was not so efficient, removing the effect of 10^{119} rather than 10^{120}, so there would be ten times the vacuum energy density we actually measure? Remember, such vacuum energy accelerates the expansion faster and faster, emptying out the Universe, cutting off the possibility of stars, planets, and eventually people.

Towards the end of the book, the authors discuss some common objections made to minimize the importance of such conclusions. One objection goes like this: improbable things happen all the time (for example, there was only 1 chance in a billion that you would have the 9-digit Social Security number that you have). The objection is easily dismissed on these grounds: improbable things do happen all the time, but improbable *lucky* things do not happen all the time. The cases of cosmic fine-tuning are not merely improbable things happening, but incredibly improbable *lucky* things happening; and it is not at all true that incredibly improbable lucky things happen all the time.

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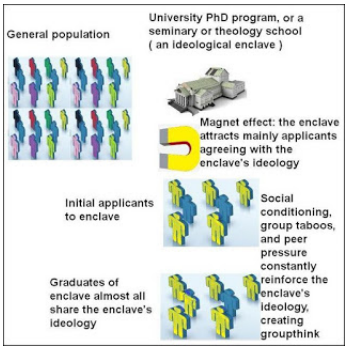

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Another objection appeals to the existence of a multiverse: maybe there are an infinity of universes, and in such a case the odds of one of them being successful might be good. This is not a sound objection because it merely increases the number of random trials; and increasing the number of random trials does nothing to increase the chance of any one random trial succeeding. If you drive into Las Vegas and drive out with $50,000,000 in your car, that's an astonishing piece of luck; and it's no less astonishing if there are an infinity of such lucky winners scattered across an infinity of universes in which an infinity of different things happen. Adding a multiverse does not increase the odds of lucky events in any one particular universe such as ours.

In so many different ways (physics, cosmology, biology) the universe seems to scream at us in a thundering voice: "Purpose and non-randomness!" But all this falls on the deaf ears of many experts in academia who keep summarizing things by telling us, "It's all just randomness."

Posted by Mark Mahin at 11:37 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmic habitability, physics, recommended books, universe

Thursday, February 9, 2017

Is Our Universe More Improbable Than a "Boltzmann Modern Earth" ?

Cosmologists sometimes discuss a possibility called a Boltzmann brain. A Boltzmann brain is the hypothetical possibility of a brain forming somewhere in space from an incredibly unlikely random combination of particles. Some have tried to explain the very unlikely existence of our universe by using reasoning along these lines: *don't be surprised to be an observer in a universe like ours, because observers can only exist in universes like ours*. But the possibility of a Boltzmann brain is sometimes presented to rebut such reasoning.

Let's consider two possibilities. In the first case, you live in a universe that is 99.9999% disorderly and chaotic, but there is just a tiny little area of space that is highly orderly, just orderly enough for your brain to exist. In the second case, you live in a universe that is orderly for vast regions stretching billions of light-years, with enough order to allow the possibility of trillions of life-bearing planets. Our reality is the second of these cases. But some cosmologists have argued that from a thermodynamic standpoint and an entropy standpoint, a "blind chance" standpoint, it is inconceivably more probable that you should find yourself as an observer under the first of these two cases.

Another possibility to consider (rather similar to a Boltzmann brain) is what we may call a "Boltzmann modern Earth." This is the incredibly unlikely possibility that a planet the size of Earth, with all of the complexity and biology of our planet, could arise fairly suddenly from a random combination of particles.

- age of mankind (1)
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- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

This possibility of a "Boltzmann modern Earth" is discussed by ace cosmologist Roger Penrose in his recent scientific book *Fashion Faith and Fantasy in the New Physics of the Universe*. On page 316 of his book, he says, "One can make a very rough estimate of the probability that life, as it now exists on Earth, with all its detailed molecular and atomic locations and motions, came about simply by chance encounters from particles coming in from space in, let us say, six days!" Penrose then estimates that such a thing would have a probability of about 1 in 10 to the ten to the sixtieth power. That is a probability not anything like the microscopic probability of 1 in 10^{60} but instead an almost infinitely smaller probability. It's the probability you would have if you started out with one tenth and then kept multiplying by one tenth a total number of times equal to a trillion trillion trillion trillion trillion times.

But then Penrose tells us that this fantastically unlikely event (a life-filled Earth like ours suddenly forming from random collisions of particles) would be far *more probable* than the existence of a universe as orderly as ours, saying it "would be a far 'cheaper' way of producing intelligent beings than the way in which it was actually done!" He's indicating that the incredibly improbable sudden formation of a "Boltzmann modern Earth" would actually be much more likely than the chance of you getting a universe such as ours accidentally.

Speaking of the Second Law of Thermodynamics, Penrose states this on page 317:

The lower-entropy earlier states of the universe that initially gave rise to humanity in its earliest stages (being of lower entropy simply by virtue of the 2nd law) must have been far more improbable (in this sense) than is the situation now. This is just the 2nd law in action. So it must be "cheaper" (in terms of improbabilities) for the state to have come about as it is now purely by chance, than for it to have arisen from an earlier much lower entropy state – if that *had come about purely by chance!*

And on page 313 Penrose states that "the improbability of the universe conditions that we actually seem to find ourselves in" is roughly 1 in 10 to the 10 to the 124th power, which is a probability almost infinitely smaller than the 1 in 10 to the 10 to the 60th power estimate he made for the chance of a planet with all of Earth's biology appearing suddenly from random particle collisions (a "Boltzmann modern Earth" occurring). This 1 in 10 to the 10 to the 124th power probability is the probability you would have if you started out with one tenth and then

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

kept multiplying by one tenth a total number of times equal to ten thousand trillion trillion trillion trillion trillion trillion trillion trillion trillion times.

Why such a low probability? The Second Law of Thermodynamics dictates that entropy must steadily increase. But right now the entropy of the universe is fairly low. Situations such as solar systems surrounded by vast amounts of empty space are very low entropy situations (as opposed to a universe that is a uniform sea of particles, which is high in entropy). It seems that if the universe has the low entropy it now has after 14 billion years of existence, the entropy of the universe must have been staggeringly low at the time of the Big Bang. And from a thermodynamic standpoint, such a thing seems insanely unlikely.

Penrose is one of the most well-known cosmologists around. If his statements on this topic are correct, then we have perhaps a tremendous irony. Centuries ago, people argued that our planet and its life could only have appeared if there were some higher power in the universe, on the grounds that it was too improbable that so much order could arise by chance. Now after all our advanced science, much of it done by people wishing to overturn such a conclusion, we may have discovered that the chance of this type of order existing randomly by chance (considering the history of the universe, the Big Bang, entropy and the Second Law of Thermodynamics) is not *greater* than was imagined long ago, but actually very much *smaller*.

Posted by Mark Mahin at 9:41 AM No comments:

Labels: Big Bang, Boltzmann brain, cosmic fine tuning, cosmology, entropy, universe

Tuesday, January 24, 2017

With Overwhelming Likelihood, a Random Universe Would Be Lifeless and Light-Less

Shortly after publishing an essay on the topic of cosmic fine-tuning that had some of the worst reasoning I have ever read on the topic (which I discuss here), the Nautilus web site is out with another essay on this weighty topic that I have often discussed on this blog. The new essay by scientist Fred Adams is entitled "The Not So-Fine Tuning of the Universe." Adams pulls some misleading tricks to try to make you believe his very wrong conclusion that "our universe does not seem to be particularly fine-tuned."

Here are the main fallacies Adams is guilty of:

- The "ant near the needle hole" fallacy of visually representing something incredibly unlikely to make it look as if it is likely
- The fallacy of considering any type of star allowing life when considering stars and cosmic fine-tuning, while not considering the equally important likelihood of stars as suitable for life's evolution as our own sun
- The fallacy of considering only less sensitive requirements when considering the likelihood of stars existing, and ignoring a vastly more sensitive requirement which makes

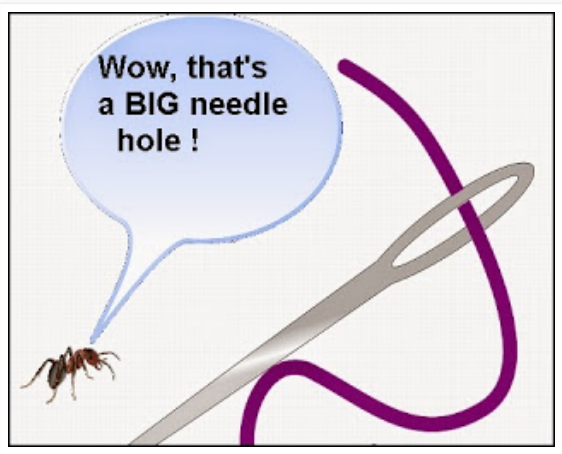
- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

the existence of stars incredibly unlikely in random universes

- The fallacy of ignoring the universe's most dramatic cases of cosmic fine-tuning, and focusing only on less dramatic cases

Adams' scientific specialty is stars. He gives us a graph that plots possible strengths of the electromagnetic force and the gravitational force in hypothetical possible universes. A shaded portion taking up a fairly large part of the graph is described as an area "consistent with life." The graph makes clear that stars require an unlikely balance between the gravitational force and the electromagnetic force, but from looking at the graph you might think that such a thing wasn't all that unlikely.

Adams here is guilty of a fallacy that we might call the fallacy of the "ant near the needle hole." Consider an ant that somehow wanders into your sewing kit. If it were smart enough to talk, the ant might look at the eye of a needle hole in your sewing kit, and say, "Wow, that's a *big* needle hole!" Such an observation will only be made if you have a perspective looking a few millimeters away from the needle hole.



Similarly, Adams has given us a graph in which his "camera" is placed a few millimeters from the needle hole that must be threaded for stars to exist. He has graphed a parameter space in which two fundamental constants vary by only a few times. But physicists routinely deal with a difference of 40 orders of magnitude (10,000,000,000,000,000,000,000,000,000,000,000,000,000), which, for example, is roughly the difference between the strength of the strong nuclear force and the gravitational force. So if we are imagining a parameter space of alternate universes, we must imagine a parameter space vastly larger than the relatively microscopic parameter space Adams has graphed. Rather than just visualizing something like the small changes in the fundamental constants Adams graphs, we should imagine that any of them could vary by a trillion times or a quadrillion times or a quintillion times.

Given such a parameter space, a realistic visual representation of the chance of a random universe having parameters allowing stars to exist would be one like the visual below, which shows a tiny needle hole

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

somewhere in the Grand Canyon. It is therefore correct to say that with overwhelming likelihood, a random universe would not have stars. Since stars are necessary for both light and life to exist, it is correct to say that with overwhelming likelihood, a random universe would be lifeless and light-less.

The misleading nature of Adams' graph is discussed on page 40 of this excellent scientific paper by physicist Luke Barnes, who concludes (contrary to Adams) that "the existence of stable stars is indeed a fine-tuned property of our universe."

The second fallacy Adams commits is the fallacy of merely considering the likelihood of stars in relation to cosmic fine-tuning, when he should also be considering the likelihood of stars as suitable for life as our own star.

Among the stars in our universe are short-lived blue stars, long-lived yellow stars like our sun, and much less bright "red dwarf" stars that are very long-lived. It could be that life exists on planets around red dwarf stars, but it is almost universally recognized that life is much less probable to arise on planets revolving around such stars. There are two main reasons, discussed fully here. One is that since red dwarf stars are much dimmer, a planet would have to be fairly close to a red dwarf star for life to exist on the planet; and at such closer distances the planet would be subjected to very troublesome tidal effects that might make it uninhabitable. The second reason is that red dwarf stars are more unstable than stars like our sun; as a wikepedia.org article says, "Red dwarfs are far more variable and violent than their more stable, larger cousins," such as our sun. Such variability would make a planet near a red star much more likely to get zapped by crippling radiation.

So it's kind of like this: yellow stars like our sun are good for the evolution of life, but red dwarf stars are not-so-good (kind of what we may call borderline possibilities). But when considering how much cosmic-fine tuning our universe has, we should consider the odds of getting the best thing we have, not just the odds of getting some "just barely works" borderline possibility. In fact, the requirements for sun-like stars are much more stringent than for red dwarf stars. The

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

physicist Paul Davies says this on page 73 of *The Accidental Universe:*

If gravity were very slightly weaker, or electromagnetism very slightly stronger (or the electron slightly less massive relative to the proton), all stars would be red dwarfs. A correspondingly tiny change the other way, and they would all be blue giants.

So we can put it this way: it is incredibly unlikely that a random universe would have any stars, and super-incredibly unlikely that a random universe would have sun-like stars. Clearly we should pay attention to both of these probabilities when judging how fine-tuned the universe is.

I can give an analogy. Suppose you walk deeply into the wooded wilderness of a national park with your friend, and come across a log cabin. You may say, "That must have been fine-tuned" or "That must have been designed." Now your friend may say, "Not so, because trees might have fallen in such a way to provide you with some type of shelter from the rain." This is fallacious, because the relevant thing to consider is the most fine-tuned thing you see, not some other less suitable thing that luck might have given you. And similarly, when considering fine-tuning in regard to stars, we should be noting that the requirements of the most suitable types of stars (stars like our sun) are much, much more stringent than the requirements of "some type of stars." Adams ignores these more stringent requirements.

The third fallacy Adams commits is the fallacy of considering only some of the less stringent requirements of stars, while ignoring the most stringent requirement for stars. The most stringent requirement of stars is that the proton charge exactly balance the electron charge. This requirement has been pointed out by the astronomer Greenstein, who pointed out that no stars could exist if the proton charge did not exactly match the electron charge.

If there was a very small difference between the electron charge and the proton charge, you would either have (1) an electrical imbalance between particles which would completely overwhelm gravity, making it impossible for stars to hold together, or (2) an electrical imbalance between particles that would completely preclude the possibility of the thermonuclear reactions we observe in stars.

In our universe each proton has a mass 1836 times larger than each electron, but the charge of the proton exactly matches the charge of the electron to at least eighteen decimal places, as measured here (the only difference being that the proton has a positive charge and the electron has a negative charge). Stars could not possibly exist if this precise fine-tuning did not exist. Adams has simply ignored this ultra-stringent requirement, focusing on less stringent requirements. Were he to consider this requirement, he might realize that stars are trillions of times less probable to exist in random universe than he imagines.

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

I may note that this requirement is an entirely different requirement than the one previously considered. So for a random universe to have stars, it must not only "thread the needle" involving the balance of the gravitational and electromagnetic force (the balance that Adams has considered), but a random universe would also have to "thread the microscopic needle" of having the proton charge exactly match the electron charge. So it is as if the arrow of the blind archer must hit not just one very distant bulls-eye for stars to exist, but two very distant bulls-eyes.

We are then doubly justified in saying: with overwhelming likelihood, a random universe would be both lifeless and light-less.

The fourth fallacy that Adam commits is the fallacy of ignoring the universe's most dramatic cases of fine-tuning, and focusing only on less dramatic cases. The three most dramatic cases of cosmic fine-tuning all seemingly involve fine-tuning more precise than 1 part in 1,000,000,000,000,000,000,000,000. They are:

- the exact match of the absolute magnitude of the proton charge and the electron charge, to more than 18 decimal places
- the fine-tuning of the vacuum energy density, discussed here, by which we have a cosmological constant more than 10^{50} times smaller than the amount predicted by quantum field theory (such as we would have if opposing parameters of nature accidentally canceled out each other to more than fifty decimal places)
- the fine-tuning of the universe's initial expansion rate (in which the universe's initial critical density matched the actual density to something like 1 part in 10^{50}).

Which of these does Adams discuss in his Nautilus essay? None of them. Of course, he does not want to discuss such things as they would obliterate his claim that "our universe does not seem to be particularly fine-tuned."

Adams is very well aware of the cosmological constant problem (also known as the vacuum density problem and the "vacuum catastrophe" problem), because he discusses it at length in a scientific paper he co-authored. There he gives us some reasoning that is as off-the-mark as his insinuations about the likelihood of accidental universes having stars.

The issue in regard to the cosmological constant is that quantum field theory predicts the cosmological constant should be 10^{60} or 10^{120} times larger than the value we observe. This prediction (which you can find discussion of by doing a Google search for "worst prediction in the history of physics") is that the vacuum of space should be super-dense – much denser than steel. But the actual vacuum of space has very little energy or density – it's almost empty.

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

We know that life could never exist if the vacuum was anything like that predicted by quantum field theory. Obviously you can't have life if the space between a star and a planet is thicker than steel – light cannot even travel through that. But an interesting question is: by how much could the cosmological constant differ from its current value and still allow life to exist?

Adams concludes that the cosmological constant could be up to 10^{30} times larger and still allow life to exist. This is almost certainly a far-too-generous estimate, and other estimates have estimated much greater sensitivity. He uses this estimate to support a conclusion in the paper that "the universe is not overly fine-tuned." But he should be reaching exactly the opposite conclusion from these facts. If the cosmological constant is supposed to be 10^{60} or 10^{120} times larger than the value we observe because of quantum considerations, and a value 10^{30} times larger than the observed value would have prevented life, then how much luck did we have in this regard to have a habitable universe? The answer is: luck with a probability of about 1 part in 10^{30} or 1 part in 10^{90}. Adams should have reached the conclusion that the universe is astonishingly fine-tuned, in a way that less than 1 universe in a billion trillion should have by chance.

Adams also gives some misinformation about the fine-tuning issue involving nuclear resonances and the triple-alpha process, a process by which stars produce energy. He claims that this fine-tuning issue "goes away," because there's some particular way in which an alternate physics could allow carbon to exist. He's using some fallacious reasoning he uses in this scientific paper. The fine-tuning issue involving the triple-alpha process and resonances is that the physics of the universe must be fine-tuned for both carbon and oxygen to exist in abundant qualities, as it does in our universe. But in his paragraph claiming a way to make this fine-tuning "go away," he does not discuss oxygen. And on page 26 of his paper, he says, "This set of simulations does not include nuclear reactions that produce oxygen, neon, and heavier elements." So he cannot truthfully claim to have made this fine-tuning issue "go away." The difficulty is explaining how a random universe could have abundant amounts of both oxygen and carbon, not just carbon.

This fine-tuning requirement is correctly stated in a 2014 scientific paper which tells us on page 16 that in order for you to have abundant quantities of oxygen and carbon, you need for the quark masses to be within 2 to 3 percent of their current values, and you also need for the fine-structure constant to be within 2.5% of its current value. You could therefore say nature has to hit two different "holes in one," and these aren't the only "holes in one" nature has to hit in order to end up with intelligent life. Because these two "holes in one" that nature must hit are different from the two other "holes in one" I discussed before, while discussing stars.

Another bit of sloppy thinking Adams gives in his Nautilus essay is when he attempts to explain away a fine-tuning of the strong nuclear

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

force by claiming that if some alternate physics were true, "The longest-lived stars could shine with a power output roughly comparable to the sun for up to 1 billion years, perhaps long enough for biological evolution to take place." This is laughable, since earthly life is believed to have required 3.5 billion years to have appeared; and obviously a universe in which stars like ours can burn brightly for 10 billion years is greatly preferable to one in which they can only burn for 1 billion years. Again, I may note that you do not explain a more favorable case of fine-tuning by imagining some much less favorable situation requiring less fine-tuning.

In his Nautilus essay, Adams misreads what nature is telling us, and his conclusion that "our universe does not seem to be particularly fine-tuned" is very much at odds with both the facts and the statements of numerous other scientists with a variety of philosophical standpoints, who have again and again stated the opposite.

Postscript: I may note based purely on Adam's graph plotting the electromagnetic force versus the gravitational force and a life-compatible region, and the fact that the potential parameter space in random universes is more than a billion trillion times larger than the parameter space he has graphed, we should conclude that the chance of stars in a random universe is less than 1 in a billion trillion (less than 1 in 1,000,000,000,000,000,000,000). The requirement of the proton charge matching the electron charge is simply a second reason for drawing the same conclusion.

Posted by Mark Mahin at 2:10 PM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmic habitability, cosmology, fundamental constants, fundamental forces, random universes

Monday, January 16, 2017

The Professor's Bad Reasoning About "Bad Odds"

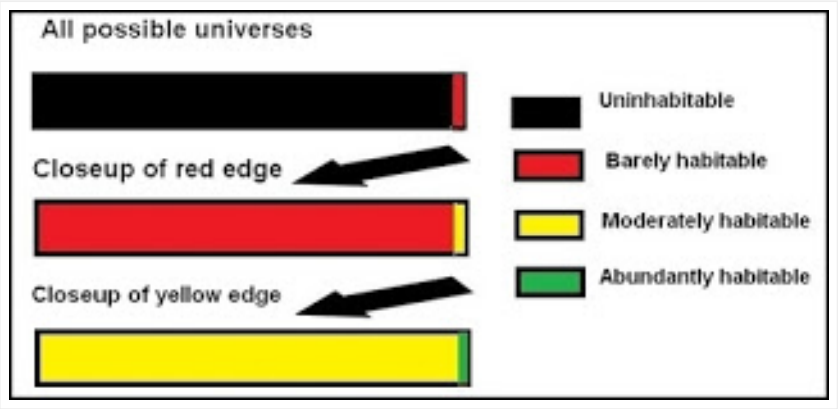
Our universe seems to be astonishingly fine-tuned to allow the existence of life. For example, if the absolute value of the proton charge and the electron charge were not exactly the same, gravitation would not be enough to hold planets together (since the electromagnetic force is roughly a trillion trillion trillion times stronger than the gravitational force, even a relatively tiny difference in the proton charge and the electron charge would cause repulsive effects exceeding the attractive effects of gravitation in large bodies such as planets, preventing their existence, as mentioned by Greenstein here). We know of no specific reason why such an equality between the proton charge and the electron charge should occur, and given that each proton has a mass 1836 times larger than each electron, it seems quite the amazing coincidence that the electron charge and the proton charge match exactly (experiments have shown they match to twenty decimal places, the only difference being that the signs are opposite).

An even greater coincidence occurs in regard to the vacuum energy density, as discussed here. Straightforward calculations tell us that the quantum contributions to the vacuum should cause empty space to be extremely densely packed with mass-energy, but no such thing occurs. Somehow we have a cosmological constant or vacuum energy density

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

more than 10^{60} times smaller than what quantum physics predicts, possibly because of an exact cancelling out of opposing effects. If it were not for such a coincidence, life would be totally impossible (no more possible than the evolution of life inside the sun). As discussed here, there are many similar coincidences involving the strong nuclear force, particle masses, the gravitational constant, and nuclear resonances.

The visual below helps to illustrate the difference between the ratios of uninhabitable, barely habitable, moderately habitable, and abundantly habitable universes, although the actual ratios are almost certainly vastly greater than illustrated in this schematic visual. I discuss these categories here, and argue that our universe must be in the rarest category (the "abundantly habitable" category shown in green).



Many have suggested that this cosmic fine-tuning suggests the likelihood of a cosmic fine-tuner. But Princeton philosophy professor Hans Halvorson disagrees. He came out yesterday with an essay entitled, “The Cosmos’ Fine-Tuning Does Not Imply a Fine-Tuner.”

Below is some of Halvorson's reasoning.

An analogy here might be apt. Suppose that you’re captured by an alien race whose intentions are unclear, and they make you play Russian roulette. Then suppose that you win, and survive the game. If you are convinced by the fine-tuning argument, then you might be tempted to conclude that your captors wanted you to live. But imagine that you discover the revolver had five of six chambers loaded, and you just happened to pull then [sic] trigger on the one empty chamber. The discovery of this second fact doesn’t confirm the benevolence of your captors. It disconfirms it. The most rational conclusion is that your captors were hostile, but you got lucky. Similarly, the fine-tuning argument rests on an interesting discovery of physical cosmology that the odds were strongly stacked against life. But if God exists, then the odds didn’t have to be stacked this way. These bad odds could themselves be taken as evidence against the existence of God.

Halvorson's reasoning in this essay is as careless as his proofreading.

The claim that “the odds didn't have to be stacked this way” is in error, if we are talking about the ratio between possible habitable universes and possible non-habitable universes. Regardless of whether any deity exists, it will inevitably be true that the class of all possible habitable universes is vastly outnumbered by the class of all possible universes. It is in general true that the number of ways in which one can arrange things so that a desirable functional end is achieved is vastly smaller

than the number of ways in which you can arrange things so that no particular functional end is achieved.

For example, if I have a garage full of atoms, the number of ways in which I can arrange those atoms so that no functional end is achieved is always going to be 1,000,000,000,000,000 times larger than the total number of ways in which the atoms can be arranged so that a working motor vehicle is created. Similarly, the total number of ways in which the physics and constants of a universe can be arranged so that nothing special will ever happen is always going to be vastly greatly than the total number of ways in which the physics and constants of a universe can be arranged so that the very many physical requirements of life (such as stable long-burning stars, stable planets, and stable atoms) are met.

So the odds in which "nothing-special" uninhabitable possible universes vastly outnumber possible habitable universes do indeed "have to be stacked this way," contrary to what the professor claims. Such an odds ratio is simply a logical necessity, and not at all something that can be "taken as evidence against the existence of God." The fact that possible uninhabitable universes vastly outnumber possible habitable universes is no more evidence against the existence of God than the fact that the set of all numbers is vastly greater than the set of all numbers with consecutive digits.

Now let's look at the professor's analogy about the gun. Here he gives us a case of a false analogy, because the situation he's describing bears no resemblance to any claim that anyone is actually making. The professor imagines a person who is forced to fire at himself a six-shooter loaded with five bullets. Here are the characteristics of a person who is forced to fire at himself a six-shooter loaded with five bullets, and then survives:

Characteristic 1: The person faces a danger point, with a strong likelihood of a disastrous result.
Characteristic 2: The person fares well from this danger point, purely as a matter of luck.

Such characteristics bear no resemblance to the assumptions of a person believing that the universe was deliberately fine-tuned for life. Suppose you imagine that a benevolent deity deliberately created the universe so that it would be habitable for life. Under such a scenario, there never is any danger point in which there is a likelihood of a disastrous result. So Characteristic 1 does not hold true. There is also no point at all in which a favorable result occurs, purely as a matter of luck. If you think that the universe was set up deliberately so that it would be habitable, you do not believe this was a matter of luck. So Characteristic 2 also does not hold true.

So with his Russian roulette analogy, Halvorson is imagining some situation that bears no resemblance to the claims made by those who think the universe was deliberately fine-tuned. Halvorson has therefore committed the fallacy of false analogy.

I can imagine using reasoning similar to Halvorson's in other situations. If someone built a nice home for you to live in, you would consider that the set of all possible unlivable or dangerous ways to arrange the bricks, nails, boards, and pipes is much greater than the set of all nice livable houses; and you would conclude from these "bad odds" either that no

one built the house or that someone evil built the house. Such reasoning would be as erroneous as Halvorson's.

Posted by Mark Mahin at 12:56 PM No comments:

Labels: cosmic fine tuning

Thursday, September 22, 2016

Trying to Shoot Down Cosmic Fine-Tuning, She Fires Only Blanks

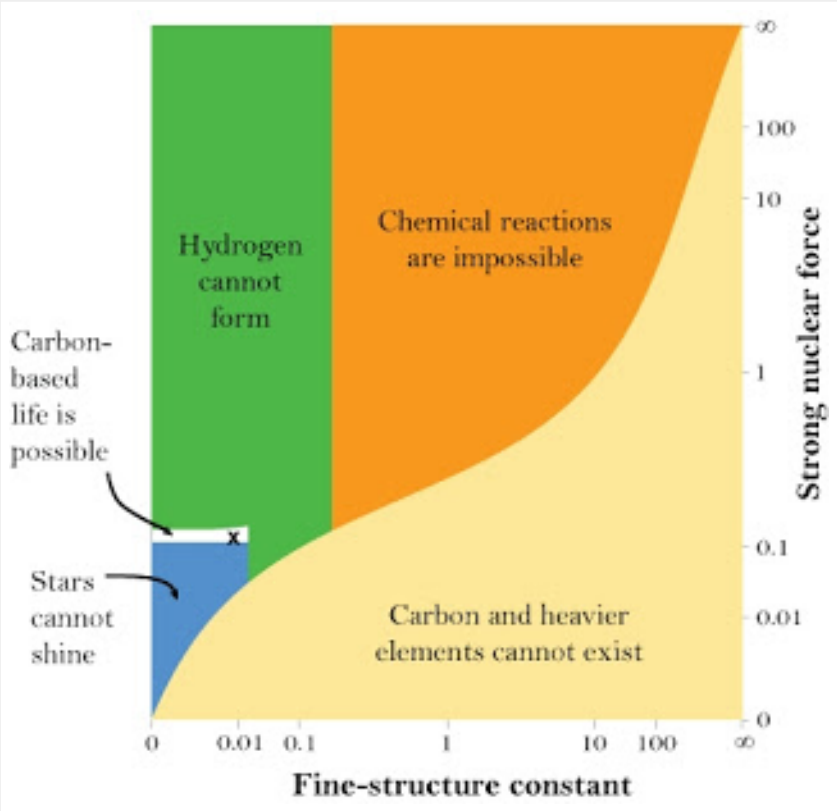
There exist numerous cases of what look like very strong fine-tuning in our universe. Both fundamental constants and natural laws are arranged in a way that allows for us to exist. It seems that the probability of all of these favorable conditions existing by chance is incredibly low. It has been argued that the probability of you existing in a universe as fine-tuned as ours is like the chance of you surviving a firing squad (having 10 or more soldiers firing their rifles at you at close range). If you survived a firing squad, it is argued, you should assume there was some purpose involved in this, and that it wasn't just a lucky accident.

But physicist Sabine Hossenfelder disagrees. She has a recent post in which she attempts to debunk what she calls “the myth that our universe is 'finetuned for life.'” Her attempt, however, is a complete failure.

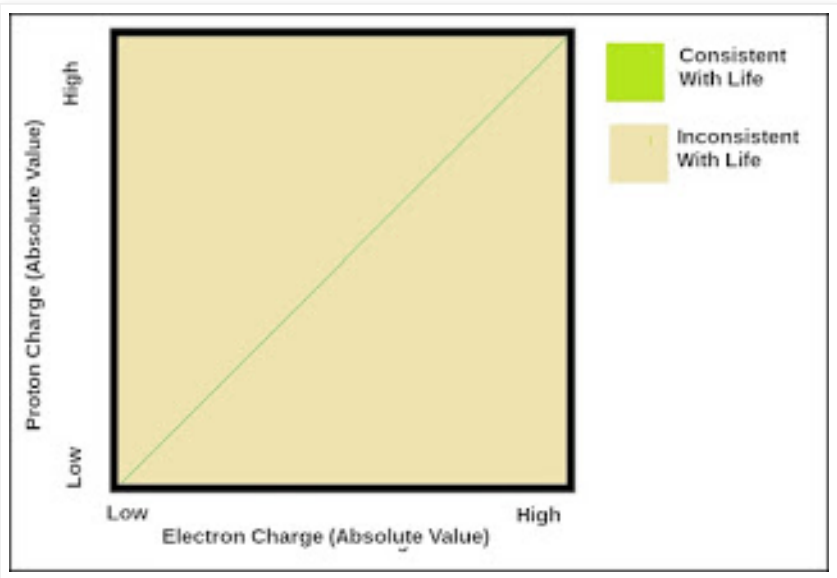
She starts out by giving a very general armchair argument:

The general argument against the success of anthropic selection is that all evidence for the finetuning of our theories explores only a tiny space of all possible combinations of parameters. A typical argument for finetuning goes like this: If parameter X was only a tiny bit larger or smaller than the observed value, then atoms couldn’t exist or all stars would collapse or something similarly detrimental to the formation of large molecules. Hence, parameter X must have a certain value to high precision. However, these arguments for finetuning – of which there exist many – don’t take into account simultaneous changes in several parameters and are therefore inconclusive.

This is not actually correct, as quite a few scientific papers about cosmic fine-tuning and the biological sensitivity of various fundamental constants do actually take into account the effects of simultaneous changes of more than one parameter. An example is the diagram below from a recent article by physicist Luke Barnes, in which he allows us to view simultaneous changes in the strong nuclear force and the fine-structure constant, showing only a tiny area that is compatible with living creatures such as ours.



Here's another example, a chart I created. The graph plots two different constants, the proton charge and the electron charge. Unless their absolute values match exactly (as they do in our universe to at least 18 decimal places), planets cannot hold together. You could actually expand this chart to be the size of a house, and it would still be appropriate to draw the green line as thin as it is here.



Then Hossenfelder claims to have found "counterexamples" that weaken the case for cosmic fine-tuning. But she's shooting blanks – her counterexamples are all duds.

The first "counterexample" she cites is a 2006 paper called *A Universe Without Weak Interactions*. She says that this paper describes a "universe that seems capable of complex chemistry and yet has fundamental particles entirely different from our own." The paper actually talks about a universe without a weak

nuclear force, one of the four fundamental forces of the universe. But the weak nuclear force has never been a very important part of arguments that the universe is fine-tuned. There are strong reasons for believing that all of the other three fundamental forces of nature (the strong nuclear force, electromagnetism, and gravitation) are very fine-tuned, but no one has claimed that the weak nuclear force is very fine-tuned.

Moreover, the 2006 paper she refers to was emphatically refuted by a later paper in 2006, a paper entitled "Problems in a Weakless Universe." The paper concluded the following:

We point out, however, that on closer examination the proposed "weakless" universe strongly inhibits the development of life in several different ways. One of the most critical barriers is that a weakless universe is unlikely to produce enough oxygen to support life. Since oxygen is an essential element in both water, the universal solvent needed for life, and in each of the four bases forming the DNA code for known living beings, we strongly question the hypothesis that a universe without weak interactions could generate life.

So Hossenfelder's first "counterexample" doesn't do anything to undermine the case for cosmic fine-tuning. Her second "counterexample" is no better. She cites Abraham Loeb's paper "The Habitable Epoch of the Early Universe." In that paper Loeb imagined that in the early universe, the cosmological constant (or the energy density of space) might have for a while been sufficient to bathe the whole universe with a warmth suitable for life. He imagined the following scenario:

1. The Big Bang occurs 13 billion years ago.
2. After about 400,000 years the universe cools enough for atoms to form.
3. About 10 million years later, planets and stars form.
4. For a few million years it is warm enough for life to exist, because of the cosmological constant, which fills all of space with a pleasant warmth.
5. Microbial life forms appear during this relatively brief period.
6. A few million years later, the continued expansion of the universe causes the universe to cool sufficiently so that the cosmological constant is no longer sufficient to keep space warm.
7. Any microbial life that may have arisen from the warmth of the cosmological constant then dies, as temperatures fall far below freezing.

But this scenario is nothing like an alternate way for the universe to be life-friendly, because this "habitable epoch of the early universe" lasts way too short a time (as the expansion of the universe quickly causes those early warm temperatures to

fade away, being replaced by deadly cold). It actually lasts (under Loeb's assumptions, as discussed here) only about two million years, as Loeb admits by saying that this epoch would last only "a few Myr," using an abbreviation for megayears (a million years). Since there was supposedly billions of years (thousands of millions of years) between the appearance of earthly microbes and the appearance of man, it is clear that two million years is not long enough for any intelligent life to evolve. It is almost certainly not a sufficient time for any life at all to develop. So the possibility discussed by Loeb is irrelevant.

When discussing whether the universe is fine-tuned to allow for intelligent life, we don't care whether there might have been some brief two-million year window in the very early universe (a short-lived period of warmth) that might have allowed mere microbes to appear before being wiped out when the universe becomes super-cold again. We care about the possibility of intelligent life appearing. In fact, it is overwhelmingly likely that the higher radiation and asteroid concentrations in any early universe would not even allow microbes to have appeared in the early universe.

Loeb's paper (discussing something both extremely improbable and irrelevant) did nothing to upset the idea that the cosmological constant is fine-tuned. The fact that the cosmological constant is enormously fine-tuned is reaffirmed by a recent scientific paper noting that the cosmological constant is 10^{123} times smaller than its "natural value," and that "there is no satisfactory solution yet for this problem." The paper's graphs suggest that there would no observers if the cosmological constant were a few hundred times smaller or larger. Given the natural value so much larger, having a cosmological constant within this range is like hitting the exact center of a target 1000 yards distant.

So Hossenfelder's second "counterexample" is a dud that does nothing to undermine the case for cosmic fine-tuning. Hossenfelder's third "counterexample" is no better. She cites a 2016 paper by Adams and Grohs discussing the "triple alpha process," a case in which nuclear physics has to be just right in order for carbon to be produced, because of what is called a resonance fine-tuning. The authors imagine other universes that might not require this particular type of resonance fine-tuning.

Hossenfelder claims that this paper is a "demonstration that a chemistry complex enough to support life can arise under circumstances that are not anything like the ones we experience today." That's wrong, because the paper actually describes universes very much like ours, but in which there are small changes in fundamental constants. And also, the paper does not actually describe an alternate universe with a chemistry complex enough to support life, because it fails to describe a

universe in which oxygen is produced in sufficient quantities. This is made clear on page 26 of the paper, in which the authors say, “This set of simulations does not include nuclear reactions that produce oxygen, neon, and heavier elements.”

It has long been recognized that the fundamental constants have to be just right for nuclear reactions in stars to produce large quantities of both oxygen and carbon, both of which are requirements for life. By failing to discuss alternate reactions in which stars produce oxygen, the paper of Adams and Grohs does nothing to undermine that fine-tuning requirement. The fine-tuning requirement is stated in a 2014 scientific paper which tells us on page 16 that in order for you to have abundant quantities of oxygen and carbon, you need for the quark masses to be within 2 to 3 percent of their current values, and you also need for the fine-structure constant to be within 2.5% of its current value. You could therefore say nature has to hit two different “holes in one,” and these aren't the only “holes in one” nature has to hit in order to end up with intelligent life.

In short, all of Hossenfelder's “counterexamples” are empty duds. She has done nothing whatsoever to weaken the case that the universe is fine-tuned. Far from being a “myth” as she claims, the finding that the universe is incredibly fine-tuned for life is one of the fundamental achievements in the past 50 years of physics, and is something that has been acknowledged by many physicists and cosmologists.

As all of her “counterexamples” are failures, Hossenfelder doesn't actually succeed in providing even a single example of some alternate universe as life-friendly as ours. Even if she were to provide such a thing, it would do nothing to discredit the claim that our universe is fine-tuned for life. Arguments about cosmic fine-tuning never claim that there is only one possible universe consistent with life, but merely claim that it is incredibly improbable that any particular random universe would be compatible with the appearance of intelligent life. There are many possible universes that would allow intelligent life to appear, but the set of all possible universes that would allow intelligent life to appear is almost infinitely smaller than the set of all possible universes, making it almost infinitely improbable that any particular random universe would accidentally meet the many requirements for intelligent life. You do not damage such reasoning in the least by showing a few other possible universes that might allow intelligent life to appear.

It's rather like this. A man may point to a car, point out its fitness for a purpose, and say, “Wow, that sure is fine-tuned” or “that sure wasn't produced by some set of accidents.” You do not at all discredit such reasoning by demonstrating that there are other possible cars with a very different appearance.

Posted by Mark Mahin at 11:41 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmological constant, cosmology

Thursday, August 25, 2016

An Analysis of the Recent Claim the Solar System Is in a "Unique Area of the Universe Just Right for Life"

Imagine if some huge extraterrestrial spaceship were to appear in a fixed position above some US city. Suppose the extraterrestrials wanted to get started communicating with us. How could they start the conversation, if their language was so different from ours that English was utterly unintelligible to them? One way would be for them to place 1836 identical small objects in a field. Every physicist would understand the meaning of this. 1836 is the ratio between the proton mass and the electron mass, a constant throughout the universe.

Or if the extraterrestrials wanted to do something similar that wouldn't require so many objects, they could place 137 identical small objects on a field. Every physicist would recognize what this meant. 137 is the number associated with a universal constant of nature known as the fine-structure constant. Its value is normally represented as 1/137 (or more exactly, 0.007297351). The behavior of stars crucially depends on the value of the fine-structure constant.

A few days ago the Daily Galaxy web site had an article involving the rather prosaic topic of the fine-structure constant. Following the Daily Galaxy's standard rule of "spice things up to the max," the article had this sensational title: *Our Solar System "Is In a Unique Place in the Universe – Just Right for Life."*

Such a title must have excited those who like to believe the egotistical idea that man is the centerpiece of the universe. But the facts cited by the Daily Galaxy story do not warrant the article's sensational title implying something special about the position of our solar system.

The article in question refers to some research published in 2012 by John Webb and his colleagues at the University of New South Wales. The relevant scientific paper can be found here. Studying the fine-structure constant (a fundamental constant generally believed not to vary in time or space), the scientists claimed to find evidence that the fine-structure constant "increases with increasing cosmological distance from Earth."

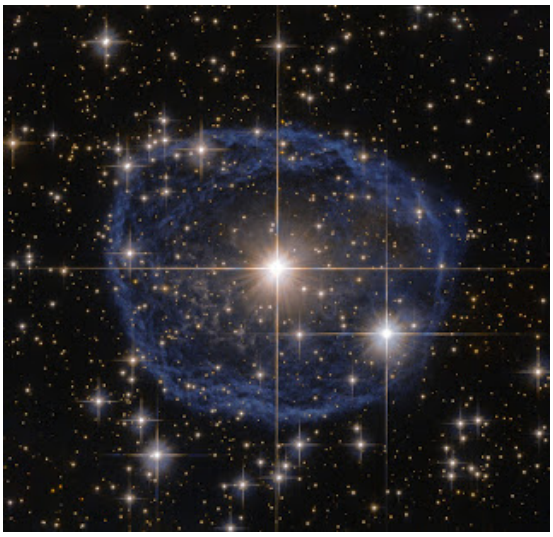
But the variation reported was only about 1 part in 100,000. There is probably insufficient basis for thinking that a variation of only 1 part in 100,000 in the fine-structure constant would rule out the habitability of a particular region.

There are some reasons for thinking that stars like the sun could not exist if the fine-structure constant were much larger or smaller. The fine-structure constant controls the strength of electromagnetism. On

page 73 of his book *The Accidental Universe*, Paul Davies states the following:

If gravity were very *slightly weaker, or electromagnetism* very *slightly stronger, (or the electron slightly less massive relative to the proton), all stars would be red dwarfs. A correspondingly tiny change the other way, and they would all be blue giants.*

But we see yellow stars like the sun all over the galaxy, and in many other nearby galaxies. So a space-dependent variation of 1 part in 100,000 cannot justify any claim that our solar system is in a "unique place in the universe – just right for life," not unless you mean "place" to mean some large fraction of the universe. The problem with such a claim is not the "just right for life" part, but the "unique" part implying some special zone of habitability in just one part of the universe.



Bubble around a bright star (Credit: NASA)

There has been other research on the fine-structure constant that does not agree with that of Webb and his colleagues. A more recent paper (published in June 2016) found no evidence for variation in the fine-structure constant, not even 3 parts in a million.

So the Daily Galaxy's article title seems to be unwarranted. Another interesting result on the fine-structure constant was reported in 2016 in a scientific paper by scientist McCullen Sandora. Sandora dealt with the "inverse fine structure constant," which is the fine-structure constant divided by 1 (this has been measured to be 137.036). The iron lying around our planet (needed for technical civilizations) is believed to have arisen in the core of a distant star (stars shoot out iron when they explode in supernova explosions). Sandora found that for stars to produce iron, the inverse fine-structure constant must have a value of 145, give or take 50.

Sandora also found a more sensitive requirement, finding that for a planet to have plate tectonics like the Earth, the inverse fine-structure constant must be 145, give or take 9. Sandora gives some complicated reasons why such plate tectonics are a requirement for the appearance of creatures such as us.

The latter finding puts the measured value of the inverse fine-structure constant (137.036) just *barely* inside the range consistent with a planet like Earth (a range between 136 and 154). This finding is consistent with the claim in this scientific paper, which says that an inverse fine structure constant "close to 137 appears to be essential for the astrophysics, chemistry and biochemistry of our universe."

The fine-structure constant is actually derived from three other fundamental constants of nature. The formula for the fine structure constant is that it is equal to e^2/hc, where e is the charge of the proton, h is Planck's constant, and c is the speed of light.

According to Sandora, planets just like ours (with plate tectonics) could not exist if the fine-structure constant varied by more than 6%. If the fine structure constant must fall in a very narrow range, then think of how fine-tuned the proton charge must be, if the fine structure constant depends on the *square* of the proton charge.

This is only one way in which the proton charge must be exquisitely fine-tuned. There is the additional fact (involving a far-greater sensitivity) that planets will not hold together unless the proton charge and the electron charge match each other to many decimal places (the only difference being that the electron charge is negative). For if there were not so precise a match (far more unlikely than you randomly guessing correctly someone's Social Security number), the electromagnetic force (more than a trillion trillion trillion times stronger than the gravitational force) would cause repulsion exceeding the gravity holding the planet together (as mentioned here). Experiments have shown that the proton charge and the electron charge do actually differ by less than 1 part in 1,000,000,000,000,000,000. This fact is unexplained by our physicists, and is extremely surprising given that each proton has a mass 1836 times greater than each electron.

We therefore have hints some very precise fine-tuning went on here, although we have no adequate reason for thinking that it is some special blessing applying only to our local region of the universe.

Posted by Mark Mahin at 12:53 PM No comments:

Labels: cosmic fine tuning, cosmic habitability, electromagnetism, fine-tuned universe

Friday, August 5, 2016

Pratfalls of the Physicists: Lessons of the SUSY and Diphoton Blunders

Ever since the atomic bomb was invented, some people have regarded physicists as almost godlike figures. But two examples I will discuss below show that large number of physicists are capable of falling flat on their faces.

What is called the 750 GeV diphoton excess is an observational blip reported in 2015 by scientists working with the Large Hadron Collider, the world's largest particle accelerator. When the diphoton excess was

reported in 2015, scientists began to speculate that it might be a sign of physics beyond the Standard Model of physics.

But today scientists poured cold water on such thinking. As discussed here, they reported that the diphoton excess is just a random data blip that doesn't indicate anything important. David Charlton, leader of the ATLAS experiment at the Large Hadron Collider, reported the following:

There was a lot of excitement when we started to collect data. But in the [latest results] we see no sign of a bump, there's nothing. It is a pity because it would have been a really fantastic thing if there had been a new particle.

But (as mentioned here) our impatient theoretical physicists have already written 500 scientific papers pontificating on the deep significance of the diphoton excess. Today's announcement makes all such papers into laughable jokes. Such papers are now like some paper claiming to find some deep significance in an arrangement of objects on a road, with someone later announcing that the objects ended up in such a way because they fell out of a passing truck at random intervals.

You can call it the Diphoton Fiasco. But such a fiasco only has lasted for about 8 months. A much larger fiasco is what we may call the SUSY Fiasco. This embarrassing physicist's debacle has been dragging on for 30 years.

It's "OOPS" time for our physicists

SUSY is a shorter name for the theory known as supersymmetry. The theory is an extremely complicated speculation. The Standard Model of physics has less than 30 independent parameters. But according to one scientific web site, supersymmetry has more than 100 independent parameters. According to another page at the same web site, more than 10,000 scientific papers “reference” the theory of supersymmetry.

With all that work by physicists, you would think that there must be some evidence for supersymmetry. But efforts to find evidence for the theory have been a complete failure. The Large Hadron Collider has completely failed to support the theory.

Why have physicists spent so much time on such a theory? It seems they were troubled by something called the hierarchy problem or the naturalness problem. The problem is hard to explain, but some excerpts

from the Wikipedia article on the hierarchy problem may give you a little scent of it.

It appears that Fermi's constant is surprisingly large and is expected to be closer to Newton's constant, unless there is ***a delicate cancellation*** *between the bare value of Fermi's constant and the quantum corrections to it. More technically, the question is why the Higgs boson is so much lighter than the Planck mass (or the grand unification energy, or a heavy neutrino mass scale): one would expect that the large quantum contributions to the square of the Higgs boson mass would inevitably make the mass huge, comparable to the scale at which new physics appears, unless there is* ***an incredible fine-tuning cancellation*** *between the quadratic radiative corrections and the bare mass.*

The "incredible fine-tuning cancellation" being talked about here is a kind of matching of two unrelated numbers so that they end up canceling each other out – rather like what you might have if you had to pay on Friday a $5000 payment to save your house from foreclosure, and you coincidentally won $5000 in the lottery on Friday morning.

But it's actually much more of a coincidence. Because according to this scientific web site, "one has to hypothesize that the several correction terms cancel out to a part in 10^34 (a hundred billionths of a billionth of a billionth of a billionth), if one is to make the Higgs mass smaller than a lead brick." So maybe our analogy should be that you own 6 houses that are each behind $5000 on the mortgage, with Friday being the last day for you to save them; and you coincidentally on Friday morning buy 6 different lottery tickets that each win $5000. That's the kind of fine-tuning that seems to be involved in the case of the Higgs mass.

Supersymmetry (also known as SUSY) is an attempt to offer an explanation for this fine-tuning, or to explain it away. But supersymmetry has always been a ridiculously ornate contrivance. For example, it imagines that almost every known type of particle has a corresponding "superpartner." It would be quite the fantastic coincidence if nature was set up in such a way. So supersymmetry is basically a kind of gigantic case of "robbing Peter to pay Paul." It tries to get rid of one fine-tuned coincidence (the hierarchy problem) by introducing a whole bunch of other fine-tuned coincidences, involving all these cases in which a known type of particle happens to have a matching "superpartner" particle.

Why do I use the term "the SUSY Fiasco"? It's because supersymmetry has been a gigantic waste of time. For years scientists were hoping that the Large Hadron Collider would produce some evidence for supersymmetry. But no evidence has been produced. The chance of supersymmetry being confirmed in our lifetimes now seems almost zero.

Below are some lessons we might learn from these blundering fiascoes. The first lesson is: avoid the hero-worship pitfall, and remember that physicists are just fallible humans like the rest of us. The second lesson is: remember that many of our scientists have an unfortunate tendency to "jump the gun" – they often get overexcited about some theoretical idea before there is good evidence for it. This tendency is abundantly evident in the field of biology as well as the field of physics. The third lesson is: when nature presents you with a dramatic case of apparent fine-tuning, don't waste tons of time twisting yourself into knots trying

to explain it away. Just live with it.

Postscript: Engaging in some morose commentary triggered by Friday's announcement, physicist Sabine Hossenfelder writes this (perhaps using hyperbole) at her blog Backreaction:

During my professional career, all I have seen is failure. A failure of particle physicists to uncover a more powerful mathematical framework to improve upon the theories we already have...What worries me much more is our failure to learn from failure. Rather than trying something new, we've been trying the same thing over and over again, expecting different results. When I look at the data what I see is that our reliance on gauge-symmetry and the attempt at unification, the use of naturalness as guidance, and the trust in beauty and simplicity aren't working. The cosmological constant isn't natural. The Higgs mass isn't natural.

She refers to the cosmological constant, because it has the same type of fine-tuning problem as the Higgs mass (as discussed here).

Posted by Mark Mahin at 10:23 AM No comments:

Labels: cosmic fine tuning, hierarchy problem, Higgs mass, particle physics, physics, supersymmetry

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Tuesday, June 21, 2016

A Critique of Carroll's "Big Picture"

We recently saw the publication of the "The Big Picture" by physicist Sean Carroll. In this book Sean paints a portrait of a gloomy, purposeless, godless universe. Along the way he commits a few errors. Below are some that I detected.

On page 154 Sean discusses the work of ESP researcher Joseph Rhine, a professor at Duke University who worked mainly during the 1930's and 1940's, producing dramatic evidence for ESP. Sean creates the impression that Rhine's work was a fluke that was never replicated. Referring to Rhine's results, Sean says "many attempts to replicate them failed," and does not mention any followup experiments supporting Rhine's results. But Sean misleads his reader on this topic. In general, subsequent experiments on ESP have indeed replicated Rhine's results, providing very powerful evidence for ESP. In particular, the ganzfeld sensory deprivation experiments provided average results of about 32% in trials in which the expected chance result was 25% (this paper looks at a series of ganzfeld studies, and concludes the probability of getting the results was only about 2 chances in 100 million). More recently, tests with autistic children (such as the scientific paper of Dr. Diane Hennacy Powell) have provided ESP results very strongly replicating Rhine's work, as have phone and email tests done by Sheldrake.

Other than a handful of passing references, Sean shows no sign of having studied anything relating to the paranormal or psychic phenomena. But Sean nonetheless dogmatically declares the impossibility of various paranormal claims, on the grounds that they are inconsistent with what he calls "the Core Theory." On page 158 he says, "And those concepts – the tenets of the Core Theory, and the framework of quantum field theory on which it is based – are enough to tell us that there are no psychic powers." Later on page 212 he states, "The Core Theory of contemporary physics...leaves no wiggle room for intervention by nonmaterial influences."

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But what exactly is this Core Theory to which he refers? In Appendix A of the book, he tells us: the Core Theory is a physics equation. Sean describes a complicated physics equation, and then says this:

So there you have it: the Core Theory in a nutshell. One equation that tells us the quantum amplitude for the complete set of fields to go from starting configuration (part of a superpostion inside a wave function) to some final configuration. We know that the Core Theory, and therefore this equation, can't be the final story.

Sean is saying that this Core Theory is basically a complicated physics equations. The inputs and outputs of that equation are purely physical things, and none of its inputs or outputs are anything that is the slightest bit biological, mental, spiritual, or psychological. It is therefore absolutely false and ludicrous for Sean to claim that this Core Theory has anything whatsoever to say about psychic phenomena, the possibility of intervention by nonmaterial influences, or anything whatsoever that is mental, spiritual, or psychological. And even if there was such an implication, it would have little force, because Sean has admitted that this Core Theory "can't be the final story." Sean also says the Core Theory is based on the "framework of quantum field theory," but (as discussed here) quantum field theory is famous for making what is commonly called the "worst prediction in the history of physics," that the vacuum of space should be super-dense (as Sean himself discusses on page 304 of his book). The idea that something so problematic can set reliable prohibitions against completely unrelated things such as psychic phenomena or nonmaterial influences is therefore doubly indefensible.

On page 220 of the book, Sean discusses near-death experiences, and claims that "no cases of claimed afterlife experiences have been subject to careful scientific protocols." This is false. For at least 25 years there have been physicians and scientists who have methodically studied near-death experiences using careful scientific protocols. For many years the Journal of Near Death Studies has been publishing scientific papers on near-death experiences, papers that have followed scientific protocols. The AWARE study published in 2014 is a study of near-death experiences authored by a large group of scientists and physicians, and it followed careful scientific protocols, and also produced some dramatic evidence results suggestive of a human soul that can leave the body.

- February (7)
- January (8)

- 2019 (95)
- 2018 (93)
- 2017 (92)
- 2016 (92)
- 2015 (97)
- 2014 (163)
- 2013 (166)

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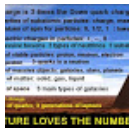
Nature Seems to Love the Number Three

When Apparitions "Break the Mold"

A Seance Prediction Matching a Senator's Most Unlikely Fate

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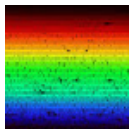
No, They Haven't Detected Life at Venus

Ten Fumbles of the "Evolution 101" Web Pages

When an Apparition Is Seen by Not Just One

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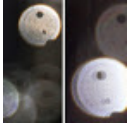
Sean seems to have taken a look at the AWARE study, for he mentions its failure to verify out-of-body experiences by using a particular technique involving visual stimuli placed above the beds of people near the brink of death. But he fails to mention that the same study reported a dramatic case of someone who reported an out-of-body experience while his heart was stopped, a person who reported various distinctive details of his heart attack resuscitation attempt that were verified. In this regard, Sean is selectively reporting facts about as fairly as someone who might describe the Apollo program only by saying, "The Apollo program tried to reach the moon, but the Apollo 13 mission failed without landing on the moon," without mentioning that the Apollo 11 and Apollo 12 missions did successfully land on the moon.

On page 220 of his book, Sean states: "Our status as parts of the physical universe implies that there is no overarching purpose to human lives, at least not inherent in the universe beyond ourselves." This is a complete non-sequitur, saying that one thing implies another when it does no such thing. We're parts of the universe, so there's no purpose to our lives? The first thing in no way implies the second.

In Chapter 36 of his book, Sean discusses evidence from physics that the universe seems to be fine-tuned in a way that allows life to exist. But Sean tries to discourage anyone who might conclude that the universe was designed for life to appear. On page 305 he states, "We don't know very much about whether life would be possible if the numbers in our universe were very different." This is entirely false. For more than 35 years scientists have been very carefully considering whether life would be possible if the numbers in our universe were very different, and have made many relevant conclusions about the matter. We know that galaxies and sun-like stars would not exist if physical constants such as the gravitational constant and the fine-structure constant were different by a relatively small amount. We know that if there were a very tiny difference between the absolute values of the proton charge and the electron charge, then planets could not hold together (the proton charge is the exact opposite of the electron charge, with the numbers matching to at least 22 decimal places). We know that small changes in the strong nuclear force in one direction would make stable molecules impossible, and that small changes in another direction would have prevented the formation of carbon and oxygen on which life depends. We know that a tiny change in the cosmological constant or vacuum energy density would have prevented a habitable universe. We know that a very small change in the neutron mass or the proton/electron mass ratio would lead to a universe in which stars like our sun could not exist. See here or here for more



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- Cosmic Coincidence Cover-up
- The Gigantic Missing Link of Biological Life

information.

Item	Requirements (Direct or Indirect)
Higgs field	Fine-tuning to 55 decimal places
Up quark, down quark, electron	Currently unexplained matter/antimatter asymmetry, Higgs field
protons, neutrons	Up quark, down quark
hydrogen atoms	protons, electrons, electromagnetic force
Galaxies	Fine-tuning of expansion rate, density perturbations, dark energy, dark matter, photon/baryon ratio, gravitation
carbon atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing carbon in stars
Oxygen atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing oxygen in stars, weak force
Heavier atoms (with more than about 25 protons)	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong force, weak nuclear force and neutrinos causing supernovae
Sunlike stars	Galaxies, fine-tuning of (1) gravitation (2) electron mass (3) Planck's constant (4) speed of light
water	Oxygen atoms, hydrogen atoms
Stable planets	Gravitation, equality of proton charge and electron charge to many decimal places (for planet to hold together)
Nucleotides	oxygen atoms, carbon atoms, molecular bonding requirements
Genetic code	Huge enigmatic requirement – "programming code from chemicals"
RNA	Nucleotides, Genetic code, water
DNA	RNA, nucleotides, Genetic code, water
Proteins, cells	DNA, RNA, Genetic code, water
Photosynthesis	Exotic quantum effects
Civilizations near sunlike stars	Heavier atoms, sunlike stars, stable planets, proteins, cells, photosynthesis, important unknown other requirements allowing Mind to arise from matter

Requirements for our existence (discussed here)

To help explain why we live in such a fine-tuned universe (while preserving his atheistic naturalism), Sean suggests the idea of the multiverse, that there are many universes. He says on page 309 that the multiverse is a "simple, robust mechanism under which naturalism can be perfectly compatible with the existence of life." Another whopper. Postulating a vast collection of other universes is not a simple assumption, but pretty much the flabbiest and most extravagant assumption possible, something that is really the precise opposite of being simple. From the standpoint of Occam's Razor and metaphysical parsimony, imagining some huge collection of other universes is actually far *less* simple than imaging a single intelligence behind the universe.

Sean also errs in saying, "if we get a multiverse in this way, any worries about fine-tuning and the existence of life evaporate." The worries he refers to are his kind of atheist worries, but he's wrong in suggesting that such worries would evaporate in the case of such a multiverse. That's because the chance of success of any one random trial is not increased by increasing the number of random trials. So if the habitability of our universe (by a series of blind chance coincidences) was a gazillion-to-one shot before imagining a multiverse, it is still exactly the same

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- The Top 6 Problems With Using a Multiverse to Explain Cosmic Fitness
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Why a Clique of Scientists Might Do Worse at Judging Truth Than a Jury

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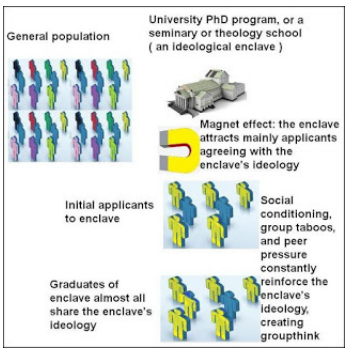

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Labels

- 3D printing (1)
- abundance (1)
- acupuncture (1)

gazillion-to-one shot after you assume such a multiverse. By assuming an infinity of universes, you do not increase by even 1 percent the chance that our universe would be habitable.

In this case Sean describes the most ridiculously flabby and extravagant state of affairs as something "simple," and he gives us the same "black is white" type of talk in describing a parallel universes theory he seems to be infatuated with. Sean describes the Everett "many worlds" interpretation of quantum mechanics, the crazy idea that the universe is constantly splitting up into different copies, so that everything possible happens in a vast collection of parallel universes. Sean says on page 167 that there is "a lot to love about the Everett/Many-Worlds approach to quantum mechanics," and describes it as "lean and mean." No, pretty much nothing you can imagine could be *less* lean. The Everett "many worlds" interpretation is pretty much the most extravagant and flabby thing imaginable. All those unnecessary parallel universes are 1,000,000,000,000,000,000 tons of metaphysical fat and flab. Calling such a theory "lean" is like calling a 900-pound man "thin."

But Sean likes the theory, which he provides no evidence for and no reasons for believing in, other than the laughably false claim that it is "lean." Since he rejects life-after-death, Sean doesn't want me to believe that my dear departed mother is in some heaven or afterlife realm. But Sean apparently does want me to believe that there are an almost infinite number of quantum copies of my mother strolling around in some vast collection of parallel universes. We have near-death experiences as a form of evidence for post-mortal survival, but zero evidence for parallel universes. Sean apparently thinks it's better to believe in something infinitely flabby and infinitely extravagant and unsupported by evidence than to believe in something vastly simpler that is supported by evidence.

Posted by Mark Mahin at 11:26 AM No comments:

Labels: cosmic fine tuning, cosmology, fine-tuned universe

Saturday, April 23, 2016

Firing Squads and Habitable Universes: The Fallacy of Appealing to an Observer Selection Effect

There exist numerous cases of what look like very strong fine-tuning in our universe. Both fundamental constants and natural laws are arranged in a way that allows for us to exist. It seems that the probability of all of these favorable conditions existing by chance is incredibly low. It has been argued that the probability of you existing in a universe as fine-tuned as ours is like the chance of you surviving a firing squad (having 10 or

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

more soldiers firing their rifles at you at close range). If you survived a firing squad, it is argued, you should assume there was some purpose involved in this, and that it wasn't just a lucky accident.

But there is a line of reasoning which attempts to remove any philosophical implications from such a situation, a line of reasoning used by those who prefer to believe that our universe is just an accident. The person who uses this line of reasoning claims that the fine-tuning of our universe can by explained by an "observer selection effect." The reasoning goes like this:

What type of universe should we expect to observe? Why, of course, it is only a universe as fit-for-life as our universe, because that is the only type of universe that could have observers. So there is an "observer selection effect" such that all observers find themselves in universes like ours, and it is not surprising that we exist in a universe like this.

The same type of reasoning can be used in regard to the analogy of the firing squad. The reasoning goes like this:

In regard to that firing squad analogy, you should not be surprised to find yourself alive after facing a firing squad. This is because there is an "observer selection effect" which guarantees that all people who make observations after facing a firing squad are those who survived the firing bullets.

Let's examine such reasoning in detail, first examining the simpler case of the firing squad.

The Case of the Firing Squad

When reasoning involving an observer selection effect is used in regard to firing squads, this "observer selection effect" is an example of what is called a red herring. A red herring is an argumentative device in which a person introduces some irrelevant or less relevant consideration, perhaps to distract you from considering a more relevant consideration. It may be true that only alive persons could observe themselves as survivors of a firing squad, but such a fact doesn't make you the slightest bit more likely to survive a firing squad. So this "observer selection effect" claim is just a red herring.

But in regard to statements such as, "You should not be surprised to find yourself surviving a firing squad, because that's the only thing you could observe," is there any validity to such reasoning? No, there isn't. In this case, it must be remembered that the case of a non-observation (no observation of anything, because you're instantly killed) is both a distinct possibility and a high likelihood. So we should not make the mistake of assuming that some observation must necessarily occur.

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

Here are some examples of correct statements and incorrect statements.

Incorrect statement: Of course, after you finish high school, you'll end up in Harvard with a nice dorm. Everyone knows a school like Harvard can afford nice dorms.
Correct statement: No, I almost certainly will not get such a dorm, because I almost certainly won't get into Harvard.

Incorrect statement: You can look forward to marrying a gorgeous starlet, because pretty much the only type of people who get to be movie starlets are gorgeous people.
Correct statement: No, I almost certainly won't marry such a starlet, because its way too improbable that I would marry anyone who is a starlet.

Incorrect statement: You shouldn't be surprised to survive a firing squad, because the only observation you could have after facing such a squad would be to observe that you survived.
Correct statement: No, I should be supremely surprised to survive a firing squad, because if I faced such a squad, it would be almost certain that I should be instantly killed and have no further observations.

The most persuasive (but devious) way to appeal to an observer selection effect is to present a loaded question, a type of question that makes an unfair assumption, as in the famous question asking: when did you stop beating your wife? The loaded question in the case of the firing squad might be: what should you see around you after facing a firing squad? Such a question is trickily phrased in a way so that the answer of survival is already answered. But such trick questions can always be answered though careful replies, as below.

Incorrect statement: What should you expect to observe after facing a firing squad? Only that you had survived, because otherwise you could make no observation.
Correct statement: You should not expect to observe anything at all after facing a firing squad, because you should be immediately killed by its bullets.

Another way to clarify the situation of the firing squad is to do what we may call an exhaustive possibility analysis. When we do such an analysis, rather than just considering two possibilities, we will try to consider every possibility. We can then consider the likelihood of each possibility.

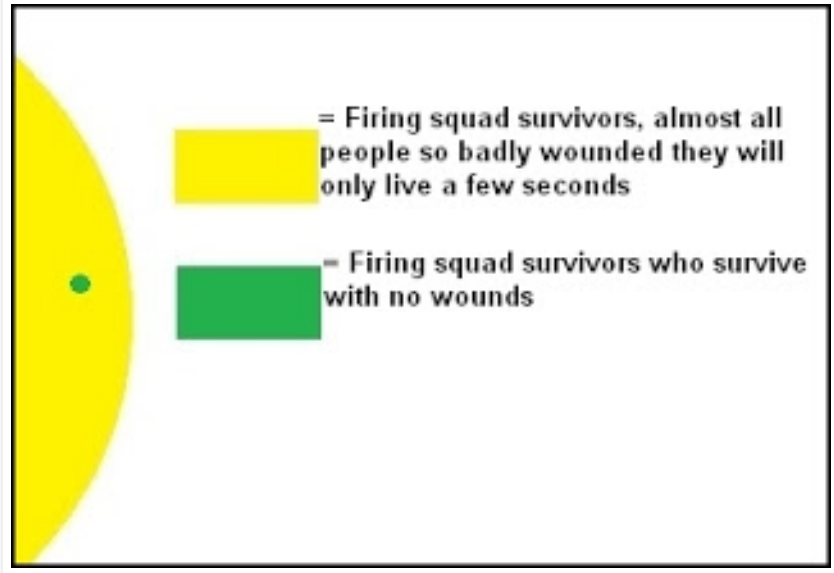
Exhaustive Possibility Analysis for Firing Squad Situation	
Possibility	**Likelihood**
Possibility 1: You immediately die	Very, very likely (unless your soul survives your death).

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

when the bullets kill you, and have no further observations.	
Possibility 2: You survive for a while, with light wounds	Very unlikely
Possibility 3: You survive for a while, with very heavy wounds that will very soon cause you to die.	Unlikely, but much more likely than Possibility 2.
Possibility 4: You survive with no wounds, because all of the bullets luckily missed by pure chance.	Incredibly unlikely
Possibility 5: You die quickly, but observe your dead body when your soul floats out of your body.	Debatable likelihood, but probably far more likely than possibility 4

When we consider all of these possibilities, it becomes clear that any type of "you should not be surprised to find yourself surviving a firing squad" reasoning (based on an observer selection effect) is utterly invalid, particularly if "survive the firing squad" means to end up in pretty good shape when the firing squad is finished. The most likely possibility is that you should instantly be killed by the firing squad, and have no observations after hearing the firing of the guns. The second most likely possibility is that you should be very heavily wounded after facing the firing squad, and have only a pitifully short observation before dying. Possibility 4 (being alive and not wounded) is extremely unlikely both in the full group of possibilities and also in the subset of possibilities that include some type of observations by you after facing the firing squad. It is not at all correct to suggest that some type of observer selection effect will make it likely that you will observe yourself in a good state after facing the firing squad.

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)



The Case of Habitable Universes

Now let's look at the case of habitable universes. The reason why I spent so much time discussing firing squads is that the situation in regard to habitable universes has a strong similarity to the firing squad situation. Here are the similarities: dying instantly in the firing squad is similar to a universe that is uninhabitable; being heavily wounded by the firing squad is similar to a universe that is just barely habitable; and surviving the firing squad without any wounds is similar to a universe that has no shortfalls in regard to habitability, which is the type of universe we find ourselves in.

Before trying to do an exhaustive possibility analysis, let us consider the type of "observer selection effect" arguments made in regard to habitable universes. Below are some examples, along with corrections.

Incorrect statement: We should not be surprised to find ourselves living in a finely tuned habitable universe, because the only type of universes that have observers are finely tuned universes.
Correct statement: We should be very surprised to find ourselves living in a finely tuned habitable universe (under assumptions of randomness), because it is vastly more likely that our universe should have been uninhabitable and not allowed us to exist as observers.

Incorrect statement: The fine-tuned nature of our universe is just as we should expect, because such conditions are prerequisites of our existence.
Correct statement: Under the assumption of randomness, the fine-tuned nature of our universe is incredibly surprising and improbable, given that there is nothing necessary about our existence.

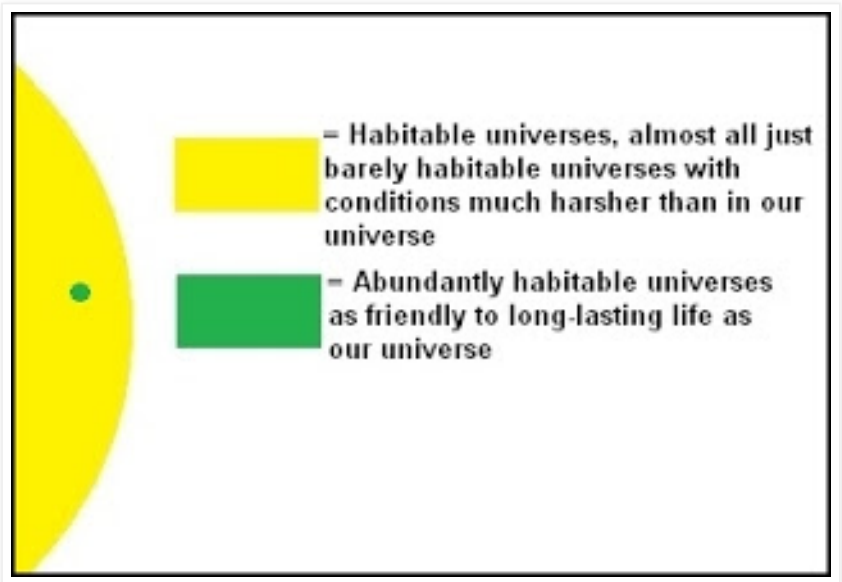
- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

Now let's try to do an exhaustive possibility analysis regarding types of universes and what type of observers (if any) they might have. This will include some interesting possibilities that are often overlooked.

Exhaustive Possibility Analysis for Observers in Random Universes	
Possibility	**Likelihood**
Possibility 1: The possibility of a random universe that is uninhabitable, and has no observers because life is impossible for one reason or another.	Very likely under assumptions of randomness
Possibility 2: The possibility of a universe such as ours, with no serious shortfall in regard to habitability	Very unlikely under assumptions of randomness
Possibility 3: The possibility of a barely habitable universe having some serious shortfalls in regard to habitability, but one in which observers are just barely possible.	Very unlikely, but much more likely than Possibility 2, because the list of conditions that must be met for a barely habitable universe is much shorter than the list of conditions that must be met for a universe such as ours (as argued here).
Possibility 4: The possibility of a universe in which biological observers cannot appear, but some other types of observers exist – perhaps souls or spirits, or minds of pure energy.	Hard to estimate this likelihood
Possibility 5: The possibility of a universe in which biological observers cannot naturally appear, but one that might be observed by visitors from other universes	Hard to estimate this likelihood, but it might be allowed by exotic "wormhole" possibilities

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

`When we consider all of these possibilities, it becomes clear that any type of "you should not be surprised that our universe is like this" reasoning (based on an observer selection effect) is utterly invalid, particularly if "a universe like this" means a universe about as habitable and life-friendly as our universe. Under assumptions of randomness, the most likely possibility is that a universe should be uninhabitable and lifeless. The second most likely possibility is a universe that is just barely habitable, with conditions much harsher than ours (such as a universe with no stars or very few stars or a universe in which either carbon or oxygen was rare). Such a universe is probably at least a thousand times easier to achieve by chance than a universe such as ours (for reasons explained here). Possibility 2 (a universe as hospitable to life as ours) is extremely unlikely both in the full group of possibilities and also in the subset of possibilities that include some type of observers. It is not at all correct to suggest that some type of observer selection effect will guarantee that observers only exist in a universe with a level of fine-tuning as great or almost as great as ours.



The most devious trick of those who evoke an observer selection effect is to phrase questions such as "What type of universe should we expect to be living in?" This is a loaded question, one that has a particular assumption built in to it (like the famous loaded question which asks when did you stop beating your wife). The very phrase "should we expect to be living in" presupposes a universe with an observer.

Incorrect statement: What type of universe should we expect to be living in? A universe like the one we do live in, for in no other universe can there be observers.

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

Correct statement: You are asking a loaded question if you ask what type of universe should we expect to be living in, because the phrase "to be living in" presupposes habitability. Avoiding such a loaded question, we should ask: what type of universe should we expect our universe to be? Under the assumption of randomness, the answer is: an uninhabitable universe in which no observers ever existed. And in the very unlikely case that our universe happened to be habitable, the most likely case by far would be that it should be just barely habitable, since the requirement list for such a universe is much shorter. Such a barely habitable universe would be much less life-friendly than ours.

"Observer Selection Effect" Reasoning at the Casino

Let's imagine a hotel casino where there's a special room called the Big Gamble. You have to pay $10 to get into the room, where you find a giant laser above your head. There's a lever you pull to try your luck. After you pull the lever, there is a 99.9999% chance that the laser will instantly incinerate you, reducing you to a charred cinder. But there's one chance in a million that you'll get a jackpot of 5 million dollars. Let's imagine a conversation between a gambler and a casino employee who gets a commission on all the people who try the Big Gamble.

Gambler: I was thinking of trying the Big Gamble, but I'm afraid it will probably just get kill me.
Casino Employee: Go ahead, take a chance!
Gambler: But I just can't see myself winning the 5 million dollars. That would be too surprising.
Casino Employee: Well, I can see you're just ignoring the "observer selection effect" here.
Gambler: What's that?
Casino Employee: Well, it works like this. If you don't get incinerated, and win the 5 million dollars, it won't be surprising at all. Because the only person who could have an observation after pulling the lever is a person who survived, and won the 5 million dollars. So you won't be surprised to have survived, because it's the only kind of observation you could have after pulling the lever.
Gambler: So it's not such a long shot that I'll win the 5 million?
Casino Employee: No, when you look at it as I just discussed, it won't be surprising at all.
Gambler: Okay, I'll make the bet.

The casino employee has used the classic argumentative technique of the red herring, something that distracts you from concentrating on what you should be concentrating on, and diverts you into thinking about some irrelevant distraction. In this case, whether or not you will be surprised by still being there after trying the Big Gamble is irrelevant. What is the

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

relevant consideration is the probability of you winning. The reasoning of the casino employee is utterly sophistical and fallacious, and when similar "observer selection effect" reasoning is used on a cosmic scale when arguing about universes, it is just as irrelevant and misleading as this casino employee's sales pitch.

Posted by Mark Mahin at 10:25 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmology, observer selection effect

Monday, April 11, 2016

Scientific Materialism Makes the Wrong Prediction About Our Universe's Habitability

In my previous post I discussed cosmic habitability categories, which involve four possible types of universes: uninhabitable universes (in which life can't exist), barely habitable universes (in which it is very hard but just barely possible for intelligent life to exist), moderately habitable universes (offering more favorable conditions), and abundantly habitable universes (in which life might be able to evolve all over the universe, with many planets having life all over them, and intelligent life having great prospects for being able to survive for eons). It seems that our universe is the fourth type of universe, as it does not have any serious shortfall in regard to habitability.

Now let us consider two interesting questions: (1) which of these types of universes are the most likely and the second-most-likely to exist? (2) what type of prediction about the habitability of the universe is implied by scientific materialism?

In my previous post I described a group of *habitability necessities* that are required for any universe to be habitable, and I also listed a series of factors I called *habitability boosters*, each of which would increase the habitability of a universe (without being an absolutely necessary precondition for the habitability of a universe). I then used these factors to define the different habitability categories:

Uninhabitable universe: A universe in which intelligent life cannot evolve anywhere, because it is missing one or more of the habitability necessities.
Barely habitable universe: A universe that has all of the habitability necessities, but none or only one or two of the habitability boosters.
Moderately habitable universe: A universe that has all of the habitability necessities, and roughly half of the habitability boosters.
Abundantly habitable universe: A universe that has all of the habitability necessities, and all or almost all of the habitability boosters.

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

So to delve into the relative likelihood of these types of universes, we must consider first : what is the chance of the habitability necessities occurring? Then we can consider what is the chance of the habitability boosters occurring.

Why a Random Universe is Overwhelmingly Likely To Be Uninhabitable

The first habitability necessity I mentioned was stable atoms heavier than hydrogen. We take heavy elements such as carbon and oxygen for granted, but we shouldn't. We should not expect them to exist in more than a very tiny fraction of all random universes. You wouldn't have atoms other than hydrogen unless you have the strange convenience we call the strong nuclear force, which binds together nuclei together, overcoming the electromagnetic repulsion between protons. First such a force must exist. Second, it must have the right strength level (and it is actually the strongest known force). You must also have electromagnetism causing a force of attraction between protons and electrons, which keeps electrons in an atom. Then you need quantum mechanical laws that prevent such attraction from causing electrons to fall into the nucleus. Given all of the ways you can wrong, it seems the chance of atoms existing in a universe of random constants and forces is very low.

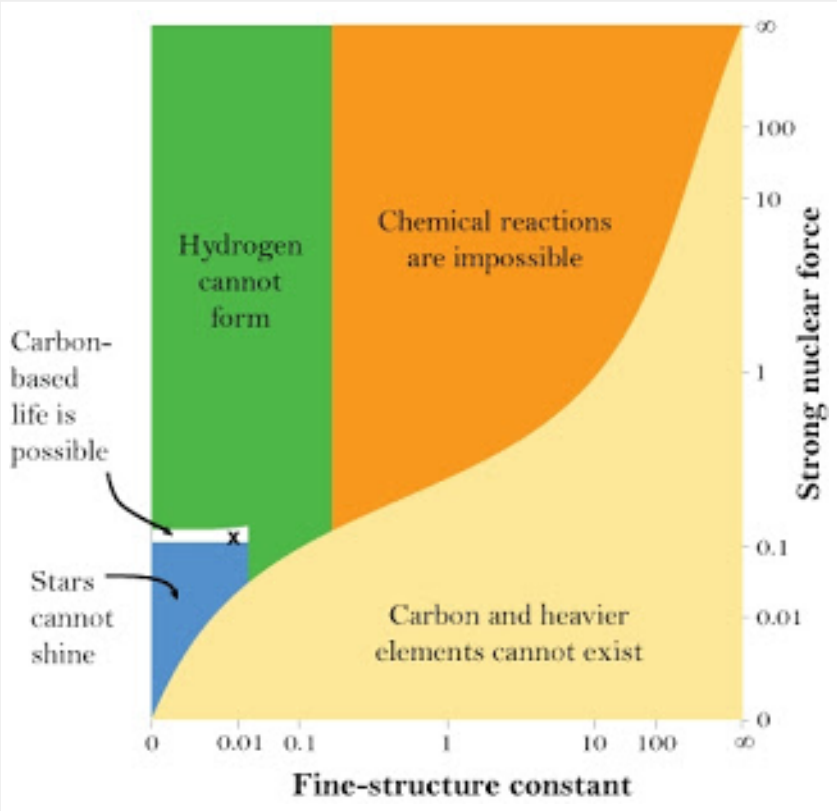
The second habitability necessity I mentioned was planets with a reasonable level of gravity. To meet this necessity a universe needs a universal force of gravitation that is attractive. The very existence of such a force would seem to be no more than a one-in-three likelihood, since we can imagine two other equally likely possibilities (a universe with no such force at all, and a universe with a force of repulsion between all particles). But the likelihood of habitable planets in a random universe is actually much, much smaller than that. For one thing, the strength level of gravitation (signified in our universe by the gravitational constant) must be within a quite narrow range of values. If gravitation is too weak, planets won't hold together. If gravitation is too large, then the gravity on all planets will so great that no animals will be able to move around on a planet (and there are also reasons why an expanding universe would have collapsed into black holes if gravitation had been much higher). There is also fine-tuning required in regard to the proton charge and the electron charge. For example, in our universe if the proton charge and the electron charge were not exactly the same, gravitation would not be enough to hold planets together (since the electromagnetic force is roughly a trillion trillion trillion times stronger than the gravitational force, even a relatively tiny difference in the proton charge and the electron charge would cause repulsive effects exceeding the attractive effects of gravitation in large bodies such as planets, preventing their existence, as mentioned by Greenstein here).

In short, while we take planets for granted (having lived on one all our lives), it seems that we should expect only a tiny fraction of random universes to have planets suitable for the existence of mobile living creatures

The likelihood of a random universe being habitable seems even smaller when we consider the third habitability necessity I mentioned, the necessity of having a relatively empty vacuum. The issue (discussed here) is that according to quantum mechanics, quantum fluctuations should cause the vacuum to be teeming with energy. This is the "vacuum catastrophe" problem or cosmological constant problem that is perhaps the biggest unsolved problem in physics. According to the predictions of quantum field theory, we should live in a vacuum that is at least 10^{60} times denser than the observed vacuum – so dense that a square meter of the vacuum should be denser than a square meter of steel. Pretty much the only idea physicists have as to why our vacuum is so relatively empty is that there was some fantastically improbable and coincidental "cancellation of contributions" leaving us with a nearly empty vacuum – something rather like the annual savings of Chinese citizens coincidentally matching the annual credit card charges of US citizens, with an exact match to the penny. The chance of such a thing in a random universes is very, very low.

The likelihood of a random universe being habitable seems even smaller when we consider the fourth habitability necessity I mentioned, the necessity of having both carbon and oxygen in the universe. Scientists have discussed how if the strong nuclear force had been slightly weaker or slightly stronger, we would have been left with a universe that would have had either lots of carbon but no oxygen, or lots of oxygen but no carbon. Apparently getting both required a lot of luck that would be very unlikely in most random universes.

Based on these considerations (which do not at all discuss all of the habitability necessities of a habitable universe), we can conclude that uninhabitable universes are vastly more likely than habitable universes. Such a conclusion has been made by quite a few previous scientists. A recent article by physicist Luke Barnes has a relevant graph showing habitable universes as just a small portion of a parameter space that is much bigger (and there are lots of bulls-eyes that nature must hit for a universe to be habitable, not just the one illustrated here).



Why a Barely Habitable Universe Should Be Vastly More Likely Than a Moderately Habitable Universe Or an Abundantly Habitable Universe

The conclusion above has been made by many writers, but now let's look at a question rarely considered, but quite important: in the class of all habitable universes, what fraction should be we expect to be just barely habitable? In other words, should we expect that barely habitable universes are vastly more common than moderately habitable universes and abundantly habitable universes?

I will now argue that we should expect exactly that, mainly because the habitability boosters that I identified are unlikely to occur in random universes. Let's look at the first habitability booster I identified, the existence of radiant stars.

The likelihood of you getting radiant stars in a random universe is discussed in section 4.7 of the scientific paper here. The paper quotes a scientific paper by Adams mentioning a 1 in 4 chance of stars being possible if you allow the fine-structure constant and the gravitational constant to have values differing from their current values by ten times. But this is an example of "putting the camera near the needle hole in order to make the needle hole look big." There's no reason why the the fine-structure constant and the gravitational constant could not have values a million times smaller or larger. When we properly consider that, we are then left with a probability of less than 1 in a million that a random universe would have radiant stars. See here for more on this issue. On page 40 of this paper, physicist Luke Barnes says, "We conclude that the existence of stable stars is indeed a fine-tuned property of our universe" – in other

words, something that would be very unlikely to occur in a random universe.

Another habitability booster I mentioned is the existence of sun-like stars. A universe that has such stars will tend to be a lot more habitable than one merely having red stars (planets around red stars are predicted to be tidal-locked planets on which there is only a ring of habitability between the side facing the star and the opposite side). It turns out that the fine-tuning for sun-like stars is far greater than the fine-tuning needing for red stars. Below is a quote from page 73 of T*he Accidental Universe* by physicist Paul Davies:

If gravity were very *slightly weaker, or electromagnetism* very *slightly stronger, (or the electron slightly less massive relative to the proton), all stars would be red dwarfs. A correspondingly tiny change the other way, and they would all be blue giants.*

It seems, therefore, that in random universes we are extremely unlikely to see sun-like stars, and that the requirements for such stars are much more special (much greater "long shots") than the requirements for stars in general, just as the requirements for getting into Harvard are much harder-to-meet than the requirements for getting into "some type of college."

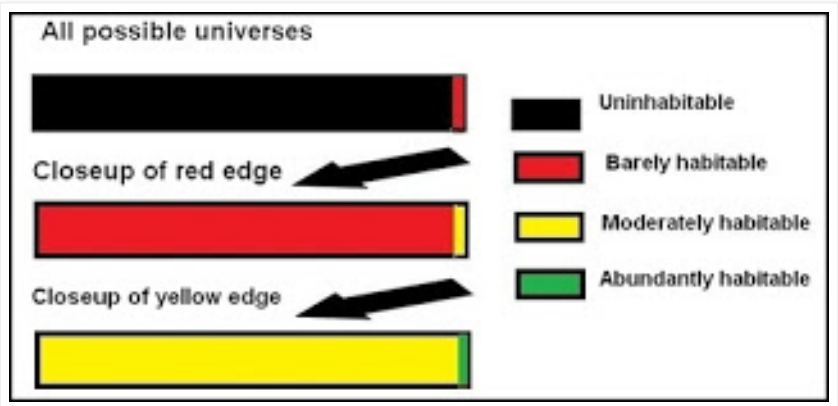
Another habitability booster I mentioned is the existence of large amounts of both carbon and oxygen. Scientists have identified this as something that would not occur unless fundamental constants are fine-tuned. According to page 41 of this paper, a 1 part in 100,000 change in one fundamental constant would change things so that the main stellar process producing carbon and oxygen would produce either carbon or oxygen, but not both. That paper concludes, "The ability of stars in our universe to produce both carbon and oxygen seems to be a rare talent." So we can conclude that this habitability booster (an abundance of both carbon and oxygen) is highly improbable in a random universe.

Another habitability booster I mentioned is low radioactivity. For simplicity let's just assume there is maybe 1 chance in 2 of such a condition. It would seem to be many times harder for a universe to have the last habitability booster I mentioned, that of low static electricity (so there are not all kinds of lethal static electricity amounts hanging around all over the place, ready to kill anyone who touches them). Low static electricity seems to require two different coincidences: the coincidence that the number of protons in a universe roughly equals the number of electrons (as it seems to do in our universe), and the coincidence that the proton charge equals the electron charge (as it does in our universe, to twenty decimal places). If you change those conditions just a little, you will be left with a universe in which there is so much free-floating static electricity

(excess charges floating about) that life should be very rare, very short-lived or both (imagine a planet teeming with billions of "static electricity landmines" and you'll get the idea).

So speaking very generally, not only are the habitability necessities rare strokes of luck that should be very unlikely to occur in a random universe, but also the habitability boosters are almost all rare strokes of luck that should be very unlikely to occur in a random universe. Consequently, barely habitable universes should be vastly more likely than moderately habitable universes or abundantly habitable universes. Barely habitable universes should be much more likely because they require much fewer "improbable strokes of luck" than moderately habitable and abundantly habitable universes.

The visual below illustrates this idea. This is a very schematic visual, and its proportions are not supposed to represent the actual ratio between different habitability categories. The visual refers merely to probabilities, not actualities. In the first bar we see something that represents very roughly a ratio between uninhabitable universes and habitable universes (although the actual fraction of habitable universes should be much smaller). The second bar is a closeup of the right edge of the first bar. When we zoom in and look at the habitable universes, we find that almost all of them are barely habitable universes, with a few (on the right side) being moderately habitable. The third bar is a closeup of the right edge of the second bar. When we zoom in and look at the universes that are better than barely habitable, we find that almost all of them are moderately habitable and only a tiny fraction are abundantly habitable. Although this visual is highly schematic, I think it gives a rough idea of the relative probabilities of a random universe being uninhabitable, barely habitable, moderately habitable or abundantly habitable.



What Prediction Does Scientific Materialism Make About Our Universe's Habitability?

Now let us consider: what type of prediction does scientific materialism make about the habitability of our universe? The

answer is: it makes a prediction that could not be more wrong.

The actual prediction that scientific materialism makes about the habitability of universe is that our universe should be about the most uninhabitable universe imaginable. This is because of the long-standing problem in physics known as the cosmological constant problem or the vacuum catastrophe problem. Because of weird quantum mechanical considerations, physics predicts the vacuum of space should be seething with a very dense sea of virtual particles, particles that should cause each cubic meter of space to have more mass-energy than solid steel. Under such conditions, no type of life could exist for even an instant – it would be easier for life to exist in the middle of the sun.

So what we get from scientific materialism is the prediction that the universe should be as uninhabitable as anything we can imagine. But suppose we grant a special favor, and simply ignore the predictions of quantum mechanics. Suppose we pay no attention to the whole cosmological constant problem and vacuum catastrophe issue that physicists have been puzzled by for forty years. What type of universe does scientific materialism then predict? It then still predicts that our universe should be an uninhabitable universe. This is simply because an uninhabitable universe should be trillions of times more likely than any type of habitable universe. That's because of all the extremely improbable long shots and coincidences for a universe to meet the habitability necessities I have mentioned (and others I haven't mentioned).

But what if we grant a *second* special favor, and assume that observers must exist in a universe, perhaps by using some kind of dubious “selection effect” reasoning or “anthropic principle” reasoning. There is no sound basis for granting such a favor, but suppose we grant it anyway. What then does scientific materialism predict? It then predicts that our universe should only be a barely habitable universe. Why? Because, as we have seen, barely habitable universes should be vastly more likely than abundantly habitable universes like the one we live in. The list of long shots and coincidences that must be met in order to have a barely habitable universe is much shorter than the list of long shots and coincidences that must be met for moderately habitable universes or abundantly habitable universes.

So even if we grant two special favors, scientific materialism still makes the wrong prediction about what type of universe our universe should be. But what if we throw in a multiverse – the assumption that there are many universes? Does that help? No, it doesn't help at all. The habitability predictions of scientific materialism regarding our universe are not changed at all if we assume that there are many universes. It is a basic fact of probability math (ignored by multiverse enthusiasts) that you

do not increase the chance of success on any one random trial by increasing the number of random trials.

The predictive failure of scientific materialism in this regard is very spectacular. It's a predictive failure far worse than has ever been made by any errant gypsy fortune teller or any misguided apocalyptic preacher. A failure this spectacular is a sure sign of underlying false assumptions. What we need is a worldview that predicts that our universe should be a type of universe like the type that it is, an abundantly habitable universe.

Posted by Mark Mahin at 11:38 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmic habitability, cosmology, types of universes

Wednesday, March 2, 2016

The Dart of the Vacuum Miracle Hit the Distant Bullseye

Perhaps the biggest mystery in physics is why the vacuum of space has so little energy in it. Although it may seem intuitive to think of the vacuum of space as empty, quantum mechanics predicts that it should be something very different: something incredibly packed with energy, a dark energy caused by all kinds of quantum fluctuations. In a TED talk a physicist discussed this:

Now, if you use good old quantum mechanics to work out how strong dark energy should be, you get an absolutely astonishing result. You find that dark energy should be 10 to the power of 120 times stronger than the value we observe from astronomy. That's one with 120 zeroes after it. This is a number so mind-bogglingly huge that it's impossible to get your head around. We often use the word "astronomical" when we're talking about big numbers. Well, even that one won't do here. This number is bigger than any number in astronomy. It's a thousand trillion trillion trillion times bigger than the number of atoms in the entire universe.

Instead of the vacuum of space being filled with this kind of energy (which would give each square meter of empty space far more density than steel), we have a vacuum of space that is almost entirely empty of matter and energy. This discrepancy between reality and prediction is sometimes called the vacuum catastrophe. But for reasons I discuss here, it really should be called instead the vacuum miracle. Having a vacuum that is relatively empty is both exceptionally improbable and very fortunate in allowing our existence. The common term used for an extremely unlikely but highly fortunate event is the term “miracle,” as in: *It was a miracle that she fell onto an open truck carrying pillows when she jumped off the high bridge.*

The vacuum miracle is something that bothers many scientists, who would prefer to believe that the universe is not so well-arranged to favor creatures like us. One way they have tried to ease this

discomfort is to suggest that perhaps there is some unknown reason why the vacuum of space has to be empty, resulting in a zero cosmological constant, or zero dark energy. But such reasoning doesn't work, because in the late 1990's it was discovered that the expansion of the universe is accelerating. This can only be true if there is a very small cosmological constant, which basically means that each square meter of the vacuum of space has a little bit of energy. Collectively this energy (the same as dark energy or the cosmological constant) is causing the expansion of the universe to accelerate.

A recent paper by five scientists suggests that a cosmological constant just like we have is actually necessary for the eventual appearance of creatures such as us. The paper states: "We find that we seem to live in a favorable point in this parameter space that minimizes the exposure to cosmic explosions, yet maximizes the number of main sequence (hydrogen-burning) stars around which advanced life forms can exist."

The paper is discussed by this article in the journal *Science*, which states:

As it turns out, our universe seems to get it just about right. The existing cosmological constant means the rate of expansion is large enough that it minimizes planets' exposure to gamma ray bursts, but small enough to form lots of hydrogen-burning stars around which life can exist. (A faster expansion rate would make it hard for gas clouds to collapse into stars.)

We can use the common phrase "threading the needle" to describe this type of fine-tuning. Or you might compare it to landing the golf ball in the golf hole, or hitting the distant bullseye target with an arrow. And given all the random quantum contributions to the vacuum, this should have been as improbable as a drunk blindfolded archer hitting the very distant target bullseye with his arrow.

But the journal *Scienc*e is written for scientists, so it was quite predictable that the article author would try to ease the discomfort of any scientists who might be made uncomfortable by this extreme example of cosmic fine-tuning. This was in accordance with the standard principle that our scientists must be kept in carefully filtered information bubbles, like 1980 Moscow bureaucrats who would get all their news from *Pravda*. Heaven forbid that the tender ears of our scientists should ever be offended by something that does not match their expectations.

So the *Science* article cites a statement by physicist Lee Smolin:

However, he adds, all truly anthropic arguments to date fall back on fallacies or circular reasoning. For example, many tend to cherry-pick by looking only at one variable in the development of life at a time; looking at several variables at once could lead to a different conclusion.

It certainly is not true that “all truly anthropic arguments to date fall back on fallacies or circular reasoning,” a claim which is just a lazy kind of dismissal similar to statements such as “all Republican arguments use fallacies” or “all Democratic arguments rely on logic errors.” In fact, the particular example given does not hold up as an example of a fallacy.

Let's imagine if you found a case in which one cosmic parameter seemed to be extremely fine-tuned for life. Would it be wrong to form an opinion based on that parameter, without considering all other parameters? It might be if you were examining some external universe, and you didn't know whether life existed in it. Because the overall situation might be like this:

1 parameter with just the right value for life to exist

5 parameters inconsistent with the existence of life

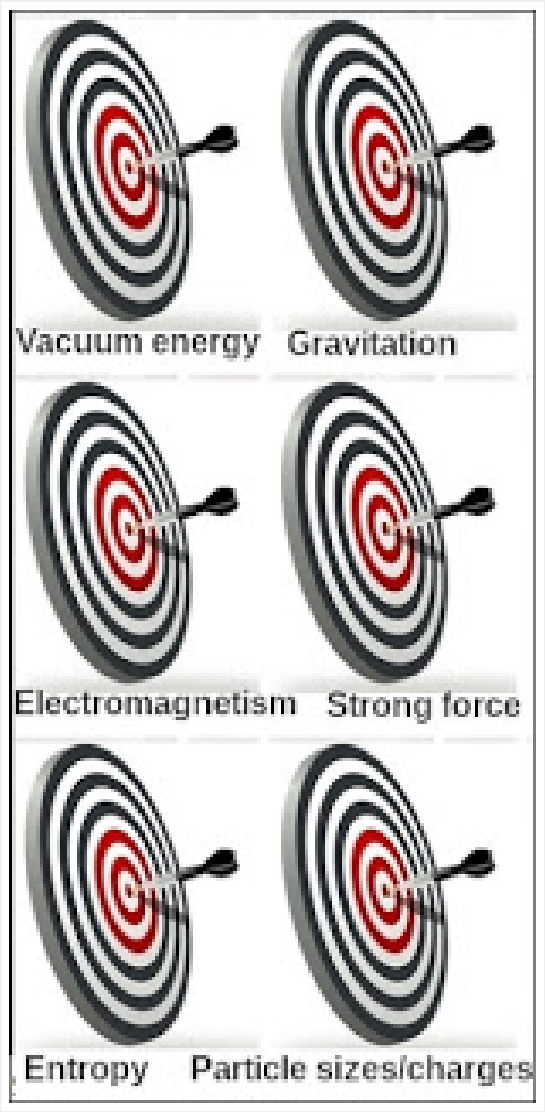
But we know that no such situation can exist in our universe, because we know that life does exist in our universe. So given the discovery of a single parameter that seems to be fine-tuned for life, the worst situation that could exist is:

1 parameter with just the right value for life to exist

All other parameters consistent with the existence of life

Even if you found such a situation, the evidence would still be pointing to a fine-tuned universe. You would have one “thumbs up,” and zero “thumbs down.”

In fact, we know the situation is much better than that. We know that there are quite a few parameters and fundamental constants which are fine-tuned for life, as discussed here and here. So we know that the situation is really: lots of thumbs up, and no thumbs down (if there were any thumbs down, we wouldn't exist). We know of lots of parameters that are very fine-tuned, and there is no chance that we will discover some other parameter that will cancel out such evidence (because if such a parameter existed we could not). The darts of nature known as the universe's fundamental constants have most improbably hit not just one distant bullseye, but lots of them.



Cosmic fine-tuning

So Smolin's reasoning here has no weight. In fact, Smolin himself showed that he is extremely impressed by the evidence that the universe is fine-tuned. This is because Smolin wrote a whole book called *The Life of the Cosmos* in which he advanced an elaborate theory designed to explain the fine-tuned features of the universe. It was a pretty goofy theory, involving the idea that universes magically pop into existence whenever black holes collapse. But at least it showed that Smolin thought that cosmic fine-tuning is something very important we need to explain.

In general, we should not pay particular attention when physicists lecture us about errors in logic, as physicists have no training in logic. You can get a PhD in physics without ever taking an introductory course in logic.

Far from involving some fallacy, the fact that our universe is incredibly fine-tuned is one of the most important things discovered by science in the past hundred years. If your philosophy doesn't mesh with such a fact, your philosophy needs to be revised.

Postscript: This post included this snarky comment: "This was in accordance with the standard principle that our scientists must be kept in carefully filtered information bubbles, like 1980 Moscow bureaucrats who would get all their news from *Pravda*." I didn't expect to see another example of that so quickly. Shortly thereafter news arrived

that a flood of complaints by scientists caused the PLOS One journal to retract a scientific paper dealing with the great amount of coordination in the human hand -- solely because the authors made three one-sentence references to "the Creator" -- for example, "The explicit functional link indicates that the biomechanical characteristic of tendinous connective architecture between muscles and articulations is the proper design by the Creator to perform a multitude of daily tasks in a comfortable way." Again, we see the *Pravda* principle at work -- the tender ears of our scientists must not be offended, the information bubble must be carefully filtered from contaminating deviations of thought, and the sociological taboos of the tribe must be rigidly enforced.

Posted by Mark Mahin at 1:56 PM No comments:

Labels: cosmic fine tuning, cosmological constant, vacuum, vacuum catastrophe

Tuesday, January 26, 2016

"Dangerous Numbers" or Providential Parameters?

In a recent TED talk entitled "Have We Reached the End of Physics?" the particle physicist Harry Cliff talks about two astonishingly fine-tuned numbers that are fundamental to the observed structure of our universe. He repeatedly calls these "dangerous numbers." This is a very strange description, because as the transcript of the talk makes clear, the numbers have just the right values needed for creatures like us to exist. So why use the word "dangerous" to describe them? Given the facts Cliff discusses, it might be more appropriate to use the term "providential" to describe these numbers.

The first number Cliff discusses is the value of the Higgs field, which Cliff describes as a "cosmic energy field." At 4:05 in the talk, Cliff says this about the Higgs field.

But there is something deeply mysterious about the Higgs field. Relativity and quantum mechanics tell us that it has two natural settings, a bit like a light switch. It should either be off, so that it has a zero value everywhere in space, or it should be on so it has an absolutely enormous value. In both of these scenarios, atoms could not exist, and therefore all the other interesting stuff that we see around us in the universe would not exist. In reality, the Higgs field is just slightly on, not zero but 10,000 trillion times weaker than its fully on value, a bit like a light switch that's got stuck just before the off position. And this value is crucial. If it were a tiny bit different, then there would be no physical structure in the universe.

This is an extreme case of fine-tuning. Physicists were so bothered by this case of fine-tuning that they spent innumerable hours (plus countless tax dollars) working on a very ornate theory called supersymmetry, designed mainly to explain away this particular case of fine-tuning. But the theory is really just one of those "rob Peter to pay Paul" affairs, as it requires the existence of a whole set of undiscovered particles, the existence of which would be just as big a case of fine-tuning as the fine-tuning that the theory tries to explain away. So far, as Cliff notes, the giant particle accelerator known as the Large Hadron Collider has failed to confirm the predictions of

supersymmetry, leaving it in a state that one commentator has described as a deathbed state.

The second of Cliff's two “dangerous numbers” is the degree of dark energy in the universe. Dark energy is believed to be an energy within empty space that is causing the universe to accelerate. Cliff describes the following disagreement between theory and observations (which is actually the biggest such disagreement ever):

Now, if you use good old quantum mechanics to work out how strong dark energy should be, you get an absolutely astonishing result. You find that dark energy should be 10 to the power of 120 times stronger than the value we observe from astronomy. That's one with 120 zeroes after it. This is a number so mind-bogglingly huge that it's impossible to get your head around. We often use the word "astronomical" when we're talking about big numbers. Well, even that one won't do here. This number is bigger than any number in astronomy. It's a thousand trillion trillion trillion times bigger than the number of atoms in the entire universe.

You can get a better grip on this idea if you understand that quantum mechanics predicts that ordinary empty space should be teeming with mass-energy, so much so that each cubic meter of empty space should be denser than steel. In fact, the quantum mechanics prediction is that each thimble-sized unit of space should have more mass-energy than if the entire Earth were packed into it.

So why do we live in a universe so different from that type of universe? Physicists basically have no clue.

Ever since the invention of the atomic bomb we have enthroned our theoretical physicists as some kind of towering geniuses, but in this respect it seems that they are really like someone who predicts this as the score of the next Super Bowl:

Carolina Panthers: 345,564,456,786,123,523,236,234,845
Denver Broncos: 24

Describing the multiverse theory, Cliff offers this wobbly explanation (perhaps just summarizing the thoughts of others):

What if all of these 10 to the 500 different possible universes actually exist out there somewhere in some grand multiverse? Suddenly we can understand the weirdly fine-tuned values of these two dangerous numbers. In most of the multiverse, dark energy is so strong that the universe gets torn apart, or the Higgs field is so weak that no atoms can form. We live in one of the places in the multiverse where the two numbers are just right. We live in a Goldilocks universe.

This is basically an "anthropic principle" explanation, the idea that we can explain some lucky number in our universe simply on the grounds that if it didn't have such a number, we wouldn't exist. But unless some willful causal agent is introduced within such an explanation, such an explanation is untenable, because you can't naturally explain something merely by referring to something else that came eons later. Causes come before effects, not after them. If event X occurred millions of years after effect Y, we cannot explain effect Y merely by referring to event X. The universe's level of dark energy and the numerical value of the Higgs field are effects that existed billions of years before life appeared, and we can't explain such effects naturally merely by referring to something that came eons later (the appearance of life).

I may add that the multiverse does nothing to fix the bad reasoning of trying to explain an effect by referring to something that came eons later. Nor would the existence of a multiverse make it more likely that our particular universe would have the right numbers by lucky coincidences, since the probability of success on any one random trial is not increased by increasing the number of random trials.

Moreover, while Cliff uses the statement "suddenly we can understand the weirdly fine-tuned values of these two dangerous numbers," his previous statements contradict that. For based on what he said earlier, a dark energy level of the type we have (very, very low) should not just be incredibly improbable but actually *impossible*. For quantum mechanics predicts (according to Cliff) that dark energy should be billions of trillions of quadrillions of quintillions of times greater than it is. So apparently according to quantum mechanics, the chance of a universe such as ours is not just very, very low, but actually zero.

Multiverses actually are not of any value in explaining the incredibly improbable, and they certainly are of no value in explaining a reality that seems to have a natural probability of zero.

See here for more on the "vacuum catastrophe" discussed by Cliff.

Posted by Mark Mahin at 1:21 PM No comments:

Labels: cosmic fine tuning, multiverse, vacuum catastrophe

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Sunday, November 15, 2015

What Neil deGrasse Tyson Doesn't Want You to Know About the Cosmos

In order to understand the sophistry of Neil deGrasse Tyson's recent comments on the universe, we must look at the fascinating issue of cosmic fine-tuning. Let's start at the beginning of time. Astronomers say that the universe suddenly began in the unexplained event known as the Big Bang, in which the universe suddenly began to expand from an infinitely dense point. Decades ago, cosmologists figured out that the initial expansion rate of the universe must have been fine-tuned to at least fifty decimal places, with what is known as the critical density exactly matching the actual density to fifty decimal places. You can do a Google search for "flatness problem" to find many sources stating this. There's a theory (or a family of theories) called the cosmic inflation theory designed to explain away this astonishing correspondence. But that theory requires a great deal of fine-tuning itself, in many places (as discussed here). So it's not clear that you end up with less fine-tuning if you believe in such a theory. Regardless if whether such a cosmic inflation theory is true, we can say that the universe's beginning was astonishingly fine-tuned, and that an incredibly tiny change in the Big Bang would have meant that we would not have ended up with a life-compatible universe such as we live in. (Universes that expand too fast don't form galaxies, and universes that expand too slow have their matter all collapse into black holes, or one big black hole.)

So the Big Bang was very fine-tuned, but we also find abundant and very precise fine-tuning in the fundamental constants of the universe. A dramatic example (another case of two numbers coincidentally matching to many decimal places) is found in the charges of the proton and the electron. Each proton has a mass 1836 times greater than each electron, and so you might think that each proton has an electric charge much greater than each electron. But no, we couldn't exist if that were the case. Instead each proton has a charge exactly the same as each electron, the only difference being that the sign of the electron charge is negative. The exact equality of the proton charge and the electron charge has been measured to 18 decimal places. We know that planets like the earth would not even hold together if the electron charge and the proton charge differed by even 1 part in 1,000,000,000,000,000,000,000,000,000 (as discussed by a scientist quoted here).

There are still many other cases of fine-tuning in the universe's fundamental constants. One is the astonishing case of the cosmological constant or vacuum energy density, where we see that nature seems to

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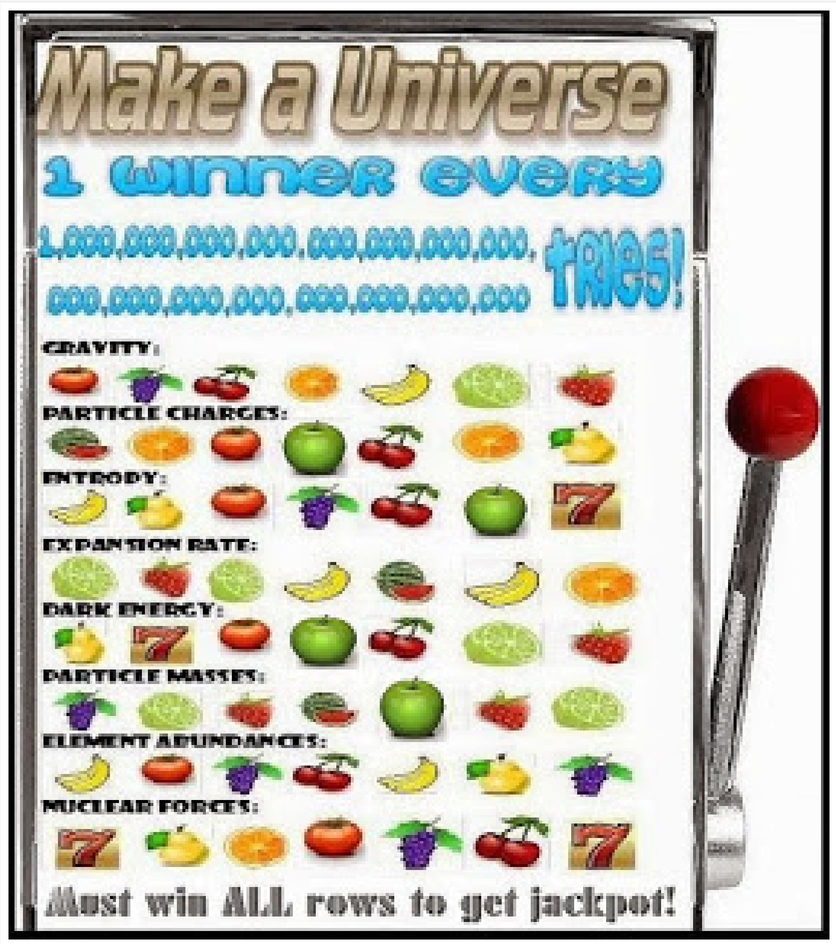
have miraculously balanced the books to 60 decimal places. This is again something on which our existence depends, because if things were not so precisely balanced, ordinary space would have more mass-energy than steel, as discussed here. There are also reasons why we would not be here if the gravitational constant were a little bit different, or the strong nuclear force were a little different, or the fine structure constant were a little different.

The following visual illustrates how right things have to be in order for creatures such as us to exist. Imagine someone pulling the lever on this slot machine. In order for you to get the jackpot (the appearance of life), you have to get a coincidental match on each of the rows. The chance of this happening is almost infinitely small. (This post discusses the particular items in this visual, and why each is extremely unlikely to be coincidentally compatible with life.)



The "lucky numbers" are only half the story, for in order to have life the universe also needs lucky laws, such as strange quantum mechanical laws assuring that electrons don't fall into the atomic nucleus, lucky laws of electromagnetism that assure that chemistry can take place, lucky laws of nuclear physics assuring that an atomic nucleus can hold together, other lucky laws of particle physics restricting the number of types of stable particles to only a handful, and a lucky Pauli exclusion principle allowing for solid matter.

So the evidence for cosmic fine-tuning is immense. This evidence has been widely discussed by scientists over the past few decades, often in discussions that used the word "anthropic." So when Neil deGrasse Tyson was asked about this question, we expected to hear from him some substantive comments. Instead we got the following reasoning:

I look out to the universe and yes, it is filled with mysteries, but it's also filled with all manner of things that would just as soon have you dead.

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► January (8)
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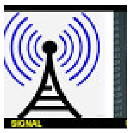
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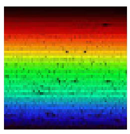
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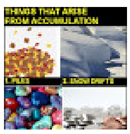
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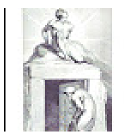
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Like asteroid strikes, and hurricanes, and tornadoes, and tsunamis, and volcanoes, and disease, and pestilence. There are things that exist in the natural world that do not have your health or longevity as a priority. And so I cannot look at the universe and say that yes, there's a God, and this God cares about my life -- at all. The evidence does not support this.

This reasoning can be summarized like this: there exist various forms of death, so there does not exist a God who is interested in you living. This is, of course, a very bad argument. The evidence that we have is entirely consistent with the idea that there exists some higher power who wants beings such as you to exist (and who set up the universe so that you and similar beings would exist), but who does not want you to live forever in a physical existence on this planet (something which would cause various problems such as extreme overpopulation and cultural stagnation). The existence of various forms of death do nothing to argue against such a possibility. Since such a possibility is strongly suggested by abundant evidence of astonishingly precise fine-tuning in the universe, it would seem to be very well supported by evidence. The claim "the evidence does not support this" is very misleading in this case. To the contrary, there is a great mountain of evidence that Tyson has done nothing to explain away.

At the core of Tyson's statement is a most absurd non-sequitur.

There are things that exist in the natural world that do not have your health or longevity as a priority. And so I cannot look at the universe and say that yes, there's a God, and this God cares about my life -- at all.

So from the fact that there are things in the natural world that "do not have your health or longevity as a priority" we can conclude there is no God? Asteroids don't care about us, so there is no God? That's a ridiculous argument.

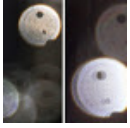
Tyson's argument is similar to arguments like this, and every bit as fallacious:

Somebody died in the house, therefore nobody built the house.
The house was hit by an earthquake, therefore nobody built the house.

Another related comment was this one by Tyson.

I think of, like, the human body, and I look at what's going on between our legs. There's like a sewage system and entertainment complex intermingling. No engineer of any intelligence would have designed it that way.

I cite this merely as an example of how absurd Tyson gets when he starts reasoning about theological topics. There is no sound basis for complaining about the design of the human penis on the basis Tyson has given, and I know of no male other than Tyson who has ever complained about the same organ being used for sex and urination. It is generally regarded as being a sign of good design when a designer gives a single object two capabilities – for example, no one complains that hammers are poorly designed because they can both hammer nails and remove nails. We also do know of intelligent designers who combine a waste disposal system and an entertainment complex. That is done by every architect who designs a movie theater, and includes bathrooms in the design.



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Having assumed the job of educating the public about the universe, Tyson should be educating the public about one of the top developments of cosmology during the past 30 years, the fact that scientists have found countless ways in which our universe is astonishing fine-tuned. But when Tyson had 13 hours of television time in his series *Cosmos*, he found time to discuss all kinds of unimportant digressions, but apparently neglected to even discuss the evidence that our universe is exquisitely well-calibrated for life. (I am judging from this lengthy summary, which makes no mention of such a topic.) Tyson is also director of the Hayden Planetarium, but nowhere in its vast exhibit spaces is the visitor informed about this very important conclusion of modern cosmology.

It would seem that Tyson doesn't want you to know about all the ways in which our universe is fine-tuned for life (in repeated defiance of enormous odds), because that might mess up Tyson's gloomy type of talk that emphasizes a universe "filled with all manner of things that would just as soon have you dead," a thesis we might describe as "the universe is trying to kill you." Neil apparently doesn't want you to think about how perfectly balanced the electrical charges in your atoms are (in a coincidence we would expect to find in less than 1 in 1,000,000,000,000,000,000 random universes, the coincidence of the proton charge exactly matching the electron charge to eighteen decimal places, despite the proton mass being 1836 times greater than the electron mass). Neil would probably be much happier if you fret about some asteroid that has maybe 1 chance in a million of killing you. I may note that it doesn't make sense to cite asteroids as evidence that the universe is stacked against us. A future generation of asteroid-mining humans (with the power to deflect asteroids) may regard asteroids as one of the greatest blessings of the solar system.

Postscript: See here for a recent post on the Scientific American web site that discusses aspects of cosmic fine-tuning. Some of the points made are below.

The constants of nature—such as c, the speed of light, and G, which denotes the force of gravity—seem to be fine-tuned for our existence. Just a slight variation in one of these values would render galaxies, stars, planets, life and even complex atoms like those that comprise your pumpkin pie impossible...Scientists also observe a fine-tuning within the physical laws themselves—the rules, such as the laws of gravity and thermodynamics, that regulate the cosmos.

Posted by Mark Mahin at 12:22 PM No comments:

Labels: cosmic fine tuning

Saturday, September 12, 2015

The Design Avoidance Contraption Known as the Cosmic Inflation Theory

The cosmic inflation theory is often confused with the Big Bang theory, but it is really just a variation of the Big Bang theory. The Big Bang theory makes the very general assertion that the universe started to expand from an incredibly hot and dense beginning 13 billion years ago. The cosmic inflation theory makes a very specific claim that during a tiny fraction of the universe's first second, the universe

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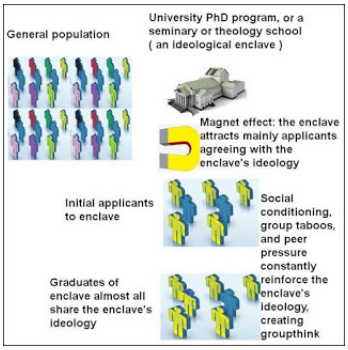
Why a Clique of Scientists Might Do Worse at Judging Truth Than a Jury

When newly awarded PhD's start writing papers and books and judging truth, they are rather like jurors who have been methodically expos...



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underwent a burst of "exponential expansion" in which the expansion rate was vastly greater than at any time in the universe's history. You can believe in the Big Bang theory without accepting the theory of cosmic inflation.

One might ask the question: if we already had the Big Bang theory, what need was there for this cosmic inflation theory? The standard answer given is that the cosmic inflation theory "fixes problems" in the Big Bang theory. What were these problems? The first problem is known as the flatness problem.

There is a density of matter in the universe known as the critical density, which is the amount of density that would be needed to stop the universe's expansion, and cause the universe to begin collapsing because of the gravitational contraction of matter. Scientists know that the actual density of the universe is close to this critical density. When cosmologists consider earlier points in the universe's history, they find that the match between the critical density and the actual density must have been even closer, with the closeness of the match being proportional to how far you go back in time. When cosmologists go back to the beginning of time, the moment of the Big Bang, they find that the critical density and the actual density must have matched to about one part in 100 trillion trillion trillion trillion trillion, or 1 part in 10^{62}. I use here the figure listed in the wikipedia.org article on the flatness problem. Why was this match so exact? This is the flatness problem.

The second problem is known as the horizon problem. This is the problem that different parts of the universe (in opposite regions of the sky) had the same temperature, even though they seem to be "causally disconnected" so that there is no way to explain their equal temperatures by assuming anything like a thermal equilibrium used to explain a uniformity of temperature in a volume of gas.

Although these issues have been called problems with the Big Bang, they are not problems at all to someone who believes that the sudden origin of the universe was a supernatural event. To such a person, the flatness problem and the horizon problem can simply be indications that the Big Bang was a carefully designed event, rather than a random natural event.

There's a phrase used in the computer software industry when a customer complains about something that was deliberately put in a computer program. The phrase is: *that's not a bug, it's a feature*. A theist could say exactly the same thing about the flatness problem and the horizon problem – they're not bugs in the Big Bang, but features of the universe's birth, features that were put in deliberately so that we could eventually be here in a nice, orderly, life-bearing universe. It is known that if the universe's actual density did not exactly match the critical density at the beginning, we would not have a universe

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
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- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
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- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
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- artificial worlds (1)
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- brain (43)
- brain experiments (1)
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- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

suitable for life – either the universe would have expanded too rapidly for galaxies to form, or the universe would have collapsed in on itself because of gravitational contraction.

Now thinking such as that may be repellent to many scientists, so it is no surprise that some scientist would have come up with some theory designed to explain away these things that may at first seem to be evidence of a very carefully designed Big Bang. The cosmic inflation theory is such a theory. If this theory were simple, we might categorize it as a *design avoidance device*, since the main purpose of the cosmic inflation theory is to avoid or evade what seems to be evidence of design in the universe's birth. But since the cosmic inflation theory is very complicated, it is more descriptive for us to categorize it as a *design avoidance contraption*. A contraption is some very complicated thing which seems ugly because of a lack of simplicity.

If you don't think it is fair for me to call the cosmic inflation theory a contraption, I will ask you to take a close look at the image below. This is from a recent scientific paper entitled "Fine Tuning May Not Be Enough," by S.P. Miao and R.P. Woodard. The paper discusses six cases of fine-tuning that are needed to make the cosmic inflation theory work:

- car culture (1)
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- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

[11, 12, 13, 14, 15]. However, there are six fine-tuning problems:

1. *Initial Conditions* — Inflation will not begin unless the inflaton is approximately homogeneous, with more potential energy than kinetic energy, over more than a Hubble volume [16, 17, 18];
2. *Duration* — Inflaton will not last long enough (more than 50 e-foldings) unless $V(\varphi)$ is very flat [8, 9];
3. *Scalar Perturbations* — The magnitude of scalar perturbations will not agree with observations unless $(GV)^3/V'^2 \sim 10^{-11}$ [19];
4. *Tensor Perturbations* — The magnitude of tensor perturbations will be too large unless $V'^2/GV^2 \lesssim 1$ [19];
5. *Reheating* — The post-inflationary universe will not reach a hot enough temperature unless the inflaton couples to ordinary matter because its gravitational couplings do not suffice [20];
6. *Cosmological Constant* — The post-inflationary universe will not evolve correctly unless the minimum of the scalar potential obeys $G^2V_{\min} \approx 10^{-123}$ [21, 22, 23, 24].

Some of these conditions work against one another. In particular, the

It is clear from the above passage that the cosmic inflation theory is a very complicated thing that has many requirements that must be just right for it work. Note the exponents in the equations above. Whenever a scientist talks about requirements and starts listing things carried to the second power or to the third power, it is a strong sign of very sensitive requirements that must be just right.

Anything with such a large set of requirements deserves to be called a contraption. This particular paper notes that "some of these conditions work against one another," meaning that if you fine-tune one of the requirements needed for cosmic inflation to work, you will tend to mess up some other requirement needed for it to work. In fact, the paper suggests that there may be no way to get all of these requirements working simultaneously (and if that's true, the cosmic inflation theory simply is not feasible). As the paper puts it:

However distasteful all this fine tuning might seem, it has always been believed that the thing could at least be done. The purpose of this paper is to point out that this may not be true.

Now if there is a lot of fine-tuning required for the cosmic inflation theory to work, it would seem that the key question to ask is this: do we actually get a reduction in fine-tuning requirements by adopting the cosmic inflation theory? We could use this technique to try to answer that question.

1. Start out by calculating the degree of fine-tuning that is required if we don't believe in the cosmic inflation theory (which would be something like that fine-tuning to 1 part in a hundred trillion trillion trillion trillion commonly mentioned in scientific discussions of the flatness problem).
2. Then estimate the total amount of fine-tuning required for the cosmic inflation theory to work (what the chance would be of all

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

the conditions for successful cosmic inflation being met in some random accidental universe).

3. If it is found that the theory of cosmic inflation theory requires more fine-tuning than the fine-tuning tuning it was designed to explain away or remove (or about the same amount of fine-tuning), discard the theory on the grounds that it does not produce much of a reduction in fine-tuning requirements.

What is astonishing is that I see no evidence that our cosmologists are actually making such a comparison. Perhaps they don't want to make such a comparison because it would mess up their pleasant-sounding triumphant narrative: *scientists find a problem with one of their most fundamental theories, but then a brilliant scientist fixes the problem*. Perhaps it is also that they want to avoid a narrative such as this: *scientists find that the Big Bang was apparently fine-tuned to an astonishing degree; scientists try to explain that away with a cosmic inflation theory; scientists eventually find that theory requires more fine-tuning than the fine-tuning it removes.*

We can compare this situation with that of a Manhattan resident who is concerned about the money he is spending on subway fares and cab fares. So he buys a car, believing that this is a money saver. He figures he is saving $200 a month by not paying for subway fares and cab fares. But there are many costs associated with the car. He has the monthly auto payments, and perhaps also a monthly interest cost. He also has to pay for car insurance. Then he has to pay a hefty monthly fee for a garage, because there's almost no vacant parking spots on the streets in Manhattan. Then there's also the fact that when he wants to drive from one spot to another in Manhattan, he will often have to pay $15 for parking, because of the lack of available parking spots on the street. When this person adds up all the costs of this "money saver" car, he may find that owning such a car is twice as expensive as just taking the subway and cabs.

Similarly, the total combined "fine-tuning" cost of all the fine-tuning required by the cosmic inflation theory may be more than the fine-tuning supposedly removed when such a theory is believed in. It could easily be that we are twice as unlikely to have randomly got a universe performing like the cosmic inflation theory as we would be to have got a universe that coincidentally started out with the critical density matching the actual density. Have cosmologists shown that this is not true? No, because they don't want to do that math – just as the Manhattan car buyer I just referred to wouldn't want to do the math showing his poor economic decision.

Posted by Mark Mahin at 12:25 PM 1 comment:

Labels: cosmic fine tuning, cosmic inflation, cosmology

Thursday, August 13, 2015

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

Electromagnetism is Algorithmic and Exquisitely Balanced (Part 2 of 2)

Two of the main forces that help keep the universe orderly are gravitation and electromagnetism. In Part 1 of this 2-part post, I explained why electromagnetism is algorithmic, in the sense of involving "if/then" logic. Now let me justify the claim that electromagnetism is exquisitely balanced.

There are two major reasons for making such a claim. Let me explain the first such reason, which has to do with the relative strength of electromagnetism. Electromagnetism is one of the four fundamental forces of the universe. If you do a Google image search using the phrase "relative strength of four fundamental forces," you will find quite a few tables that compare the strength of these fundamental forces. The tables typically give numbers like this:

Fundamental Force	Relative Strength
Strong nuclear force	1
Electromagnetism	1 divided by 137
Weak nuclear force	10^{-6}
Strong nuclear force	10^{-39}

We see here that electromagnetism has a very specific strength level that is about a trillion trillion trillion times stronger than the force of gravitation. Referring to the short-lived stars known as blue giants (which don't last long enough to support planets where life evolves), and to the type of stars known as red dwarfs (generally regarded as being stars not as suitable for Earth-like planets as yellow stars like our sun), the physicist Paul Davies says on page 73 of *The Accidental Universe*: "If gravity were *very* slightly weaker, or electromagnetism *very* slightly stronger (or the electron slightly less massive relative to the proton), all stars would be red dwarfs. A correspondingly tiny change the other way, and they would all be blue giants." So apparently the existence of sun-like stars depends on electromagnetism having a level of strength very close to its actual strength.

We also know from consideration of the atom that the electromagnetic force is finely tuned. There is an electromagnetic force of repulsion between the protons that make up much of the nucleus of an atom, and the nucleus holds together only because there is a strong nuclear force holding protons together (along with neutrons). That strong nuclear force is only about 100 times stronger than the electromagnetic force. A fairly small increase in the electromagnetic force would cause atoms with more than 6 protons in their nucleus to become unstable because of the electromagnetic repulsion between protons. In such a case the calcium in your bones (not to mention the iron in your blood) would be radioactive. A fairly small decrease in the electromagnetic force would mean that electromagnetism would be insufficient to allow for the complicated molecules on which life depends.

So apparently our universe lucked out with the strength level of electromagnetism that we have. This is one way in which electromagnetism is exquisitely balanced. But there's another way, which pertains to the strength of the charges on the proton and the electron. At the subatomic nature there is great uniformity, in the sense that each electron is exactly like every other electron, and each proton is

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

exactly like every other proton. Each proton has a mass 1836 times greater than the mass of each electron. If one knew only of this fact, and knew nothing about how strong the charges are on these particles, you might guess that the charge of a proton is about 1000 or 2000 times greater than the charge of each electron. But that is not the case. Instead, the charges are exactly the same (although by convention – a not really warranted convention – the charge of an electron is called a negative charge).

According to scientists, the charge of the proton is $1.60217657 \times 10^{-19}$ coulomb, and the charge of the electron is $-1.60217657 \times 10^{-19}$ coulomb. This scientific paper is by a scientist who used a molecular beam deflection method to conclude that the proton charge and the electron charge have a magnitude differing by less than 5 parts in 10,000,000,000,000,000,000.

The chemistry on which life depends could not exist if the magnitude of the charge on the electron did not match the magnitude of the charge on the proton. It would require only a small difference between the two to make planets unstable (not surprising because electromagnetism is a force about a trillion trillion trillion times greater than the gravity that holds our planet together).

In his book The Symbiotic Universe, astronomer George Greenstein (a professor emeritus at Amherst College) says this about the equality of the proton and electron charges: "Relatively small things like stones, people, and the like would fly apart if the two charges differed by as little as one part in 100 billion. Large structures like the Earth and the Sun require for their existence a yet more perfect balance of one part in a billion billion."

So we have the second reason why electromagnetism is exquisitely balanced. But it would be easy for you not to notice this second reason, because scientists use a little semantic convention that almost seems to have been designed to hide or cover up this exquisite balance. The semantic convention is one that involves failing to list the proton charge and the electron charges as separate constants, but referring to them as a single constant called the "elementary charge."

We can see how this is kind of a cover-up by considering an analogy. Imagine that your parents were born on exactly the same day and the same hour. If you listed those two times and dates of birth in a table like the one below, it would really catch your attention, and might make you think that perhaps some meaningful synchronicity was involved. You might think to yourself, "This isn't just a coincidence."

Father's birth place	San Diego, USA
Mother's birth place	Toledo, USA
Father's birth date/time	January 22, 1990 10:37 PM EST
Mother's birth date/time	January 22, 1990 10:37 PM EST
Parental assets	$22,035.00

But imagine you wanted to hide this coincidence. You might instead list this data in the following table, which someone might read without

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

noticing any coincidence.

Father's birth place	San Diego, USA
Mother's birth place	Toledo, USA
Parental birth date/time	January 22, 1990 10:37 PM EST
Parental assets	$22,035.00

Here we have a little trick in which the two separate birth dates and times of the parents are listed under a single row marked "Parental birth date/time." This kind of hides the coincidence of the exact match (or at least makes it much harder to notice).

Scientists use a very similar little trick in listing the fundamental constants of nature. A typical table listing the fundamental constants will start out looking something like this (with the charge of the proton and the charge of the electron represented by a single row labeled "elementary charge"):

Gravitational constant	$6.67384(80)\times10^{-11}\ m^3\cdot kg^{-1}\cdot s^{-2}$
Planck's constant	$6.626\ 069\ 57(29) \times 10^{-34}$ J·s
Proton mass	$1.672\ 621\ 777(74) \times 10^{-27}$ kg
Electron mass	$9.109\ 382\ 91(40) \times 10^{-31}$ kg
Elementary charge	$1.602\ 176\ 565(35) \times 10^{-19}$ C

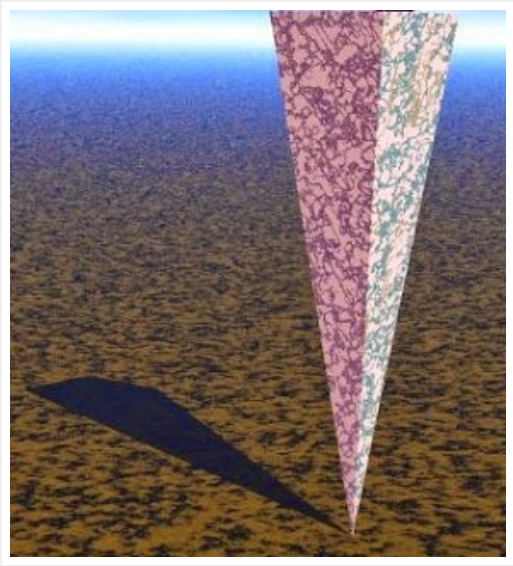
But this is the same kind of trick as the "parental birth date/time" trick mentioned above. There is no physical basis for assuming that the charge of the proton and the charge of the electron are the same actual thing -- they are instead two separate things that happen to exactly match. The honest, correct way to list the above constants is as follow.

Gravitational constant	$6.67384(80)\times10^{-11}\ m^3\cdot kg^{-1}\cdot s^{-2}$
Planck's constant	$6.626\ 069\ 57(29) \times 10^{-34}$ J·s
Proton mass	$1.672\ 621\ 777(74) \times 10^{-27}$ kg
Electron mass	$9.109\ 382\ 91(40) \times 10^{-31}$ kg
Proton charge	$1.602\ 176\ 565(35) \times 10^{-19}$ C
Electron charge	$-1.602\ 176\ 565(35) \times 10^{-19}$ C

When we see the constants listed as above, we suddenly notice the coincidence of the proton charge and the electron charge matching exactly. The actual match is not just to 10 decimal places (as indicated in the table below), but to at least 18 decimal places.

Electromagnetism (upon which all life depends) is algorithmic, involving "if/then" logic (as I explained in Part 1 of this post). Electromagnetism is also exquisitely balanced, for the two reasons given in this post. The exquisite balance of electromagnetism is comparable to what we would have if an obelisk the size of the Washington Monument was balanced on its top.

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)



Electromagnetism is only one aspect of physics, which is only part of science. But it would seem that electromagnetism by itself has an intrinsic ingenuity and extreme fine-tuning that is sufficient to suggest weighty philosophical implications.

Posted by Mark Mahin at 12:20 PM No comments:

Labels: cosmic fine tuning, electromagnetism, fundamental constants, fundamental forces

Monday, August 10, 2015

Electromagnetism is Algorithmic and Exquisitely Balanced (Part 1 of 2)

Two of the main forces that help keep the universe orderly are gravitation and electromagnetism. Electromagnetism actually seems to have "if/then" logic embedded within it, although scientists have used a semantic cheat that tends to hide this reality.

Before scientists advanced an equation describing electromagnetism, there was first Newton's famous law of gravitation. The equation for this law is one that can be used to calculate the gravitational attraction between any two objects in the universe. The equation looks like this.

$$F = \frac{G m_1 m_2}{d^2}$$

In this equation F represents the force of gravitation between the two objects, m_1 represents the mass of the first object, m_2 represents the mass of the second object, and d is the distance between the two objects. G is a fundamental constant of nature called the gravitational constant.

After this equation was introduced, scientists began learning a lot about electrical charges. Before too long, someone had the idea: let's try to describe electromagnetism with an equation similar to the equation for gravitation. But there was a problem with that. Gravitation always results in attraction. But electromagnetism is a force that can either result in attraction that moves thing closer together, or repulsion that tends to push things apart.

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

It works like this: if you have two particles nearby that are both protons (or both electrons), there is an electromagnetic force of repulsion between them. But if one of the particles is an electron and the other particle is a proton, there is an electromagnetic force of attraction between them. If one of the two particles is a neutron, then there is neither a force of electromagnetic repulsion between the two, nor a force of electromagnetic attraction between the two.

But how to shoehorn such a setup so that it follows an equation similar to the law of gravitation? Scientists came up with an answer. The answer was to create a semantic convention by which electrons are considered negative charges, and protons are considered positive charges. Using such a convention, it was possible to declare Coulomb's law, which is stated as follows.

$$F = k\frac{q_a q_b}{r^2}$$

In this equation F represents the force of electromagnetic attraction or repulsion between the two objects, q_a represents the charge of the first object, q_b represents the charge of the second object, and r is the distance between the two objects. K is a fundamental constant of nature. Under this formula, a negative number (for F) is considered a force of attraction, and a positive number (for F) is considered as a force of repulsion.

For scientists, this semantic convention works very well. It allows them to do exact calculations involving electrical charges. There is just one problem with this semantic convention: it is a cheat, a cheat that is not justified by the actual situation we find in nature. We can call this cheat "Coulomb's cheat."

Judging nature purely by its actual characteristics (without considering semantic conventions or what is convenient for scientists doing calculations), it is not accurate to say that electrons are negative charges and protons are positive charges. Nature itself has no characteristics that justify the claim that a proton has a positive charge and an electron has a negative charge.

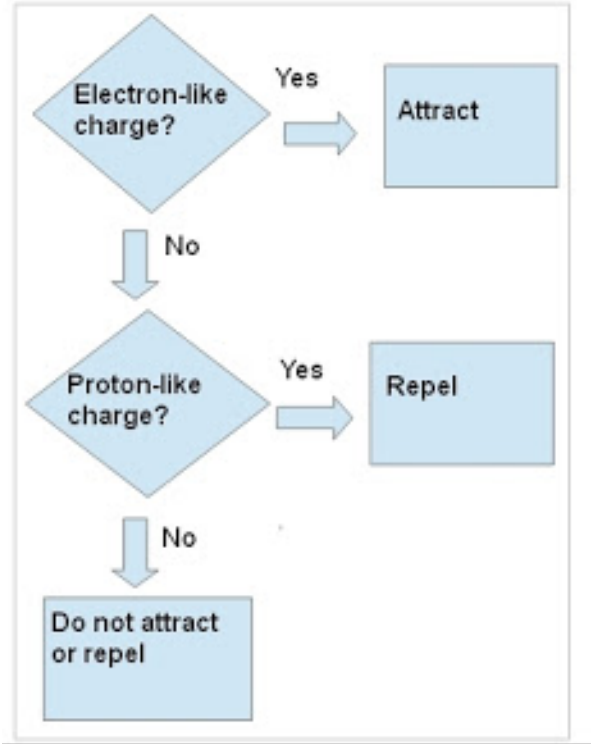
It is easy to imagine universes in which it might be justified and accurate to call the electron charge negative and the proton charge positive. One such universe would be one in which electrons always caused a repulsion between themselves and other particles, and in which protons always caused an attraction between themselves and other particles. But we don't live in such a universe. It might also be accurate to call the electron charge negative if electrons tended to produce repulsion more often than they tend to produce attraction. But as far as scientists can tell, electrons do not tend to produce more repulsion than attraction, and produce just as much attraction as repulsion. The same thing is true for protons.

So the long-honored semantic convention of considering electrons as negative charges and protons as positive charges is not actually warranted by what we find in nature. But how can we accurately describe what is going on, without using this time-honored cheat? For starters, we can stop using the terms "negative" and "positive" in talking

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

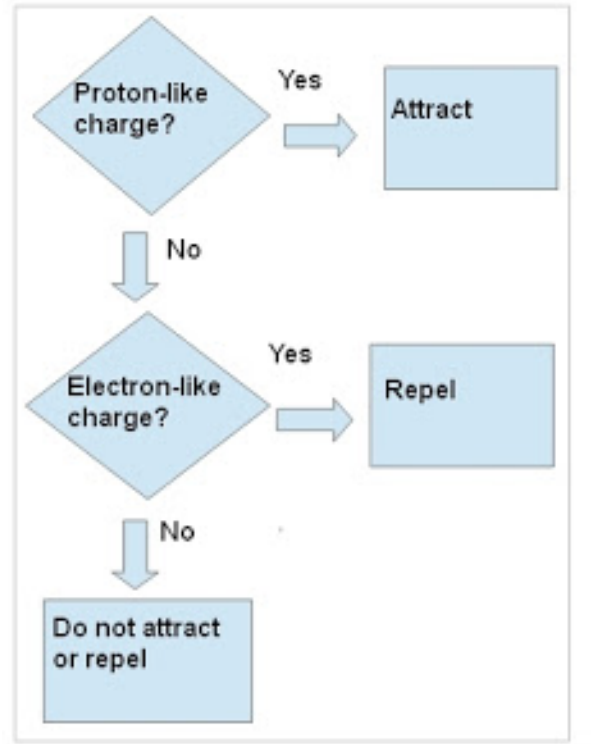
about charges, and simply use the term “proton-like charges” to refer to charges like that of the proton, and the term “electron-like charges” to refer to charges like that of the electron.

To describe what is going on in nature (without using Coulomb's cheat), we can use two flowcharts. Below is a flowchart that describes the rule followed by a proton in regard to how to react to some nearby particle.



Flowchart followed by a proton

Below is a flowchart that describes the rule followed by an electron in regard to how to react to some nearby particle.



Flowchart followed by an electron

These flowcharts give us an accurate description of electromagnetism, without the unwarranted cheat of considering electrons as negative

charges and protons as positive charges. But when you look at these flowcharts, you might have quite a realization. The realization is: nature is actually computing to determine whether there should be an attraction, a repulsion or neither between two particles. What is going on is not simply a law that can be expressed as an equation. What is going on is that nature is using an algorithm, a bit of programming, some “if/then” logic. Each one of those diamonds in the diagram represents a piece of “if/then” logic. Each line leading out of the diamond represents either an “if” or a “then” in some "if/then" logic.

This particular piece of “if/then” logic is actually fundamental to our existence, because if nature stopped performing this piece of code at any instant, the chemistry in our bodies would instantly be turned off, and we would all die within a few seconds.

The realization that electromagnetism is fundamentally algorithmic is not at all a trivial one. If nature has programming inside its very core – if it has "if/then" logic at the heart of one of its most fundamental forces – it is reasonable to assume that programming is controlling other key operations of nature, such as the development of large-scale order, the origin of life, and the origin of intelligence. Pondering this at length, it becomes all too reasonable to assume that since the time of the Big Bang, the universe has been progressing along a path that it was programmed to achieve from the very beginning.

So far I have justified the first part of this post's title, by explaining why electromagnetism is algorithmic. But what about my claim that electromagnetism is exquisitely balanced? I will justify that claim in the second part of this two-part post, and will explain two ways in which electromagnetism is as finely balanced as the Washington Monument would be if it were positioned upside down, and balanced on its top tip.

Posted by Mark Mahin at 12:26 PM No comments:

Labels: cosmic fine tuning, electromagnetism, fundamental forces, programmed material universe

Tuesday, May 19, 2015

Stubbornly Denying the Evidence For Cosmic Fitness

Recently I read two books that touched upon the issue of cosmic fine-tuning, a question that I have often written about on this blog. One excellent book is the rather poorly titled book “Modern Physics and Ancient Faith” by Stephen M. Barr, a physics professor at the University of Delaware (which doesn't at all brush away religious thinking as an ancient relic, despite the title). In that book there is an interesting discussion of “anthropic coincidences” that are necessary for our existence. One example given is that of a parameter called *v*. On pages 126-127 the book makes these interesting comments:

The long technical name of the parameter v is “the vacuum expectation value of the Higgs field.”....The value of v is a great puzzle to particle theorists; in fact, it is one of the central puzzles of physics. What is puzzling is that in reasonably simple theories v seems to want to come out to be, not 1, but a number like 10^{17}, i.e, 100,000,000,000,000,000...As far as the possibility of life emerging in our universe is concerned, it would be a disaster for v to be 100,000,000,000,000,000. It would also be a disaster if it were 100,000,000,000,000, or if it were 100,000,000, or if

it were 100,000, or if it were 100. Indeed, it would be a disaster if it were 10, or 5, or even 1.5. It would probably be a disaster if v were even slightly different from the value it happens to have in the real world.

So nature "hit the bullseye," a very distant bullseye, it would seem. This is only one of many astonishing "coincidences" required for our existence. Barr lists seven other such cases, one of which is even more dramatic: the fine-tuning of the cosmological constant. As Barr puts it on page 130 of his book:

In order for life to be possible, then, it appears that the cosmological constant, whether it is positive or negative, must be extremely close to zero – in fact, it must be zero to at least 120 decimal places. This is one of the most precise fine-tunings in all of physics.

To their credit, modern cosmologists and physicists have been very open and candid about discussing such "coincidences." I could easily fill up a longish blog post doing nothing but quoting all of the physicists and cosmologists who have remarked on how remarkably fit-for-life or seemingly fine-tuned our universe seems to be. But there is one exception. Physicist Marcelo Gleiser will have none of this thinking. On page 232 of his book *A Tear at the Edge of Creation*, Gleiser stubbornly says, "There is absolutely no evidence that our Universe is fit for life."

If I didn't know that some physicists make enormously silly assertions about infinities of parallel universes, and ask you to believe there are an infinite number of copies of yourself, I might call the previous statement by Gleiser the silliest thing I have ever heard from a physicist. It's a statement that would only make sense if you were a robot scanning a biologically lifeless universe.

Glesier provides no real scientific statements or references to back up his weird claim that there "is absolutely no evidence that our Universe is fit for life." He merely gives a little armchair reasoning that does not hold up to scrutiny.

First, Gleiser attempts to persuade us that someone reasoning that the universe is fit for life is like someone coming into a library and concluding that all of the books were made for him, or that all of the books were made for English-speaking readers like himself. But this analogy isn't appropriate, and doesn't correspond to the type of reasoning made by those who point out the ways in which the universe is fine-tuned for life.

Let's imagine a scale of claims ranging from the very specific to the very general.

1. Things are arranged in a way that benefits (or makes possible) me in particular.
2. Things are arranged in a way that benefits (or makes possible) people who speak my language.
3. Things are arranged in a way that benefits (or makes possible) humans in general.
4. Things are arranged in a way that benefits (or makes possible) carbon-based life forms.
5. Things are arranged in a way that benefits (or makes possible) some type of life, rather than preventing any type of life.

Gleiser is suggesting that those who say that the universe is remarkably fit for life are like people who make the first assertion, or possibly the second assertion. But they are not. Almost all claims of cosmic fitness or cosmic-fine tuning involve claims like the last of these claims, claims that are extremely general and cannot be attacked on a basis of assuming an

intention too specific. So Gleiser's library analogy isn't fair, and doesn't back up his claim. It's particularly weak for Gleiser to be using a library analogy to try to back up a claim of cosmic non-fitness for life (as a library consists of manufactured objects that were designed for a specific purpose).

Gleiser then goes on to give this reasoning:

For a clever fish, water is "just right" for it to swim in. Had it been too cold, it would freeze; too hot, it would boil. Surely the water temperature had to be just right for the fish to exist. "I'm very important. My existence cannot be an accident," the proud fish would conclude. Well, he is not important...The ocean temperature is not being controlled with the purpose of making it possible for life to exist.

This reasoning does nothing to establish Gleiser's strange claim that there "is absolutely no evidence that our Universe is fit for life." In his fish analogy he is talking about a particular organism that is adapted to a particular local parameter (the water temperature); cold-water fish are adapted to cold water, and warm water fish are adapted to warm water. But none of the main "anthropic coincidences" mentioned in discussions of cosmic fitness involve merely local conveniences, nor do any of them involve things to which the human organism or earthly life has adapted itself to. Instead, they involve things that are prerequisites for any type of life at all – and most of them involve things that are prerequisites for any type of universe with stable solid matter and stable stars. So Gleiser's little fish analogy falls flat. Again, the analogy has no relevance to the typical discussions of physics and cosmic fitness.

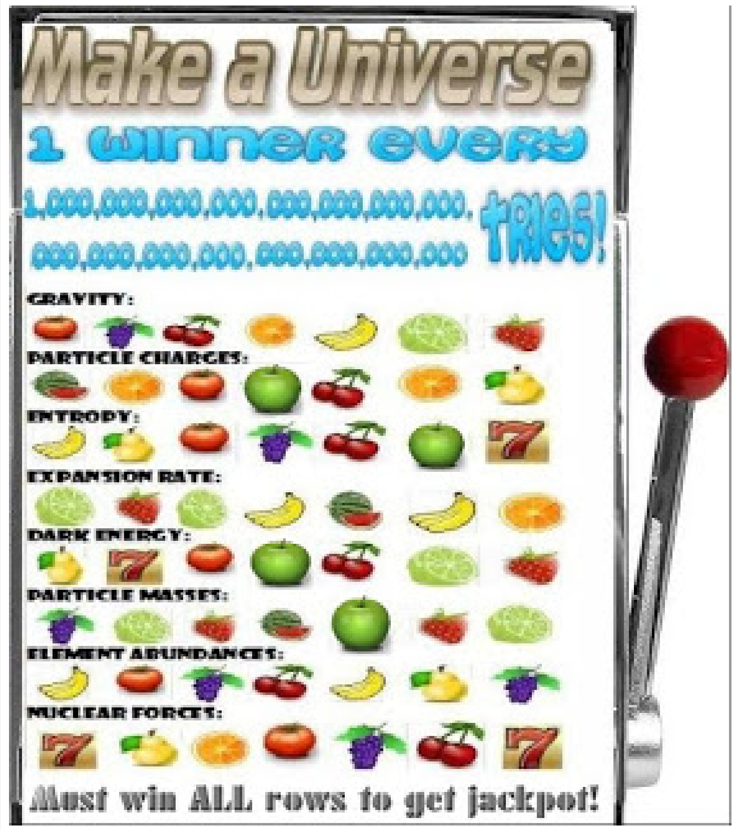
Gleiser then gives this reasoning:

Think of the billions, probably trillions, of barren worlds in our galaxy alone. I can't read the message "just right" for life written in so many dead worlds.

This makes no sense at all. Since planets can have different distances from a star, there will inevitably be some planets that are barren because they are too cold or too hot. But the existence of such planets does nothing to discredit a claim of cosmic fitness for life, particularly since some of these "barren" planets (such as Jupiter) help indirectly to allow life to flourish (if Jupiter didn't exist, our planet would get hit by too many comets and asteroids, many of which are diverted by Jupiter's gravity). "Fitness for life" simply means having the characteristics that allow life to exist, not some much more extravagant claim such as "designed in a way that results in 100% of available planets bearing life."

Finally, Gleiser lamely asks: "If the constants of nature are so fit for life, why is life so difficult to find?" The answer is: it isn't, and it's all around us. As for looking for extraterrestrial life, we've just begun to do that, and we still haven't spent the money needed to make a very serious effort in that regard (as spending on SETI has been "peanuts" compared to what was spent on big physics projects such as the Large Hadron Collider) .

Gleiser's reasoning on this topic is without merit, and I smell a very stubborn denialism in his claim that "there is absolutely no evidence that our Universe is fit for life." Quite to the contrary, many modern physicists and cosmologists have admitted that there is abundant evidence that the universe is astonishingly fit for life. Read here for more about this topic.



Only some of the lucky "coincidences" needed for life's existence

Posted by Mark Mahin at 1:43 PM No comments:

Labels: anthropic principle, cosmic fine tuning

Wednesday, March 25, 2015

The Top 6 Problems With Using a Multiverse To Explain Cosmic Fitness

For several decades scientists have discovered more and more examples suggesting our universe is seemingly tailor-made for life. A list of many examples is discussed here. One dramatic example is the fact that even though each proton in our universe has a mass 1836 times greater than the mass of each electron, the electric charge of each proton matches the electric charge of each electron exactly, to twenty decimal places (the only difference being that one is positive, the other negative). Were it not for this amazing coincidence, our very planet would not hold together. But scientists have no explanation for this coincidence which seems to require luck with a probability of 1 in 100,000,000,000,000,000,000. As wikipedia states, “The fact that the electric charges of electrons and protons seem to cancel each other exactly to extreme precision is essential for the existence of the macroscopic world as we know it, but this important property of elementary particles is not explained in the Standard Model of particle physics.”

Wishing to cleanse their minds of any suspicions that our universe may not be the purely accidental thing they imagine it to be, quite a few materialists have adopted the theory of a multiverse. This is the idea that there are a vast collection of universes, each very different from the other. The reasoning is

that if there were to be, say, an infinite number of universes, each with different laws and properties, then we would expect that at least one of them would have the properties necessary for intelligent life, no matter how improbable it may be that such properties would exist.

But there are many problems with trying to use a multiverse to explain cosmic fitness, or to explain anything at all. Let me list some of them.

1. A multiverse explanation is the worst imaginable violation of Occam's Razor

The first reason is that a multiverse violates to the most extreme degree imaginable the long-standing principle of Occam's Razor, which has been evoked by many a scientist over the centuries. Occam's Razor is the principle that “entities should not be multiplied beyond necessity” when explaining things, or that we should prefer to explain things as simply as possible. A multiverse is the greatest imaginable violation of the principle of Occam's Razor. A multiverse is what you might propose if you were following the exact opposite principle, a principle of “entities should be multiplied to the greatest number possible” when trying to explain something (a demented principle we might call “Anti-Occam's Razor”).

2. A theory of a multiverse is unverifiable metaphysics that can never be confirmed by observations

Although often made within scientific discussions, the theory of a multiverse is a metaphysical theory which can never be confirmed through scientific observations (despite insinuations to the contrary by multiverse proponents). Contrary to what some have claimed, looking for evidence of some unusual “flow” in some part of our universe could never confirm a theory of a multiverse, nor could any observations of early universe conditions. Such observations would at best imply that there was something that we did not understand about our universe, or that perhaps there was some “sister universe" next to our universe (although such an area should more properly just be considered an unobserved part of our universe). We could never make any observations from our universe that would confirm that there are a vast number of other universes with different characteristics.

3. A theory of a multiverse makes one believe in the exact opposite of what our observations tell us --- that the laws and properties of nature are the same everywhere

An additional problem with the multiverse is that it leads one to believe in something that is 100% contrary to what our

observations tell us. All observations made by physicists and astronomers support the idea that the universe is incredibly uniform. By comparing observations made by pointing telescopes in opposite directions of the sky, astronomers can compare one section of the universe with other sections on the opposite side of the observable universe. When they do this, they find a picture of incredible uniformity. The cosmic background radiation, for example, is uniform to within 1 part in 100,000. The laws of nature seem to be the same everywhere. The universe looks the same in all different directions. We have no good evidence that the laws of nature and the universe's fundamental constants have varied across the observable universe during the past ten billion years. If they had, the universe would not look as it does to astronomers.

So nature is screaming at us: uniformity, uniformity, uniformity. But the multiverse theory paints the exact opposite picture, a picture in which there is nothing like uniformity (with each universe having different characteristics). To believe such a theory, we must ignore the message that nature is shouting at us, and believe in some other imagined reality that is the exact opposite of what we observe. In a very real sense, therefore, the theory of a multiverse is counter-observational. Believing in an infinite variety of universes each with very different properties is rather like believing that the sun cycles through an infinite variety of different shapes – an interesting idea, and perhaps possible, but one that is completely at odds with what our observations tell us.

4. A multiverse explanation "proves" the wrong thing – that *some* universe would be habitable (without increasing the chance that *our* universe would be habitable)

Another problem with the multiverse reasoning is that it "proves" the wrong thing. An effective theory of multiple universes would be one that showed a likelihood that our universe would have the characteristics necessary for life purely by chance. The multiverse theory does not claim to show that. Instead it claims to show that "some universe" would by chance have the properties necessary for life. Now you may say: *"some universe" and "our universe" – so what, no big difference*. But there actually is a gigantic difference between the two. Confusing "some universe" and "our universe" (thinking as if they were the same) is an error in logic, an example of careless, sloppy thinking.

I can best illustrate the point by mentioning the case of a lottery. The Powerball lottery is a lottery with an incredibly low chance of winning, and a gigantic jackpot. Each year they sell enough Powerball lottery tickets to make sure that at least one person will win, but the chance of any lottery ticket buyer

winning is less than 1 in a million. So consider these odds (which might be pondered by a couple that purchased a ticket):

Chance of some ticket winning: 100%
Chance of our ticket winning: less than 1 in 1,000,000,000

So as we can see, there is a gigantic world of difference in this case between "some ticket" and "our ticket." There is an equally gigantic world of difference between "some universe" and "our universe" when we consider universes. Showing that some universe (under a multiverse theory) would be successful does not show that our universe would be successful.

In fact, the multiverse scenario does absolutely nothing to make it more likely that our particular universe would by chance have the characteristics necessary for intelligent life. If the chance of our universe being successful were 1 in a billion trillion quadrillion before we assume the multiverse, that chance is exactly the same even after we assume a multiverse.

When mathematicians talk about probability, they speak of a trial as being something that might produce a favorable outcome (examples are a roll of a dice, a dealing of 5 cards from a deck, or a purchase of a lottery ticket). But it is a general rule of probability that increasing the number of trials does not increase the chance of success of any one trial.

From a purely explanatory standpoint, a multiverse is therefore the ultimate absurdity: a theory that introduces infinite baggage that serves no explanatory purpose, because it does not increase the odds of our universe being successful. The thing that a multiverse "explains" (*some* universe being successful) is not what we need to have an explanation for (the fact that *our* universe was successful despite such enormous odds).

I can illustrate the futility of a multiverse explanation with the following lines of dialog:

John: It required so many improbable coincidences for our universe to have intelligent life – what could be the explanation?
James: A lucky "1 in a zillion" accident – pure blind luck.
John: That's too farfetched, because it would have required something like a 1 in a 1,000,000,000,000,000,000,000 shot.
James: Well, there could be a multiverse. Maybe there's an infinite number of universes. Some of them might have got lucky.
John: An interesting thought. But still, why was *our* particular universe so lucky?
James: A lucky "1 in a zillion" accident – pure blind luck.

Here James has introduced an extravagant theory that accomplishes nothing. Before introducing his multiverse theory, his explanation for the universe's habitability was a lucky 1 in a "zillion" accident, and he is still stuck with that explanation even after introducing the multiverse scenario. The multiverse theory accomplishes nothing for him.

5. There is no verified case of anything ever being successfully explained by a type of explanation like a multiverse explanation, nor can we plausibly imagine any such case ever being verified

The typical process of rational explanation can be described as follows: (a) examine some thing that needs to be explained; (b) select some type of explanation that has been proven successful for other cases; (c) apply such an explanation to explain the thing that needs to be explained.

For example, if we see something strange in the sky that is unexplained, we can try to explain it by selecting "weather phenomenon" as our type of explanation, because we know that numerous previous items have been successfully explained by postulating weather as the explanation (for example, the morning dew on the grass of your lawn). More adventurously, we can explain the strange thing in the sky as an alien spacecraft. While we do not have a verified case of anything being successfully explained by exactly postulating an extraterrestrial spacecraft, we do have numerous observations that we know have been successfully explained by advancing this *type* of explanation – numerous strange lights in the sky have been explained successfully by mentioning some type of spacecraft (earthly spacecraft).

But in the case of a multiverse, it is an entirely different story. We have not one single verified case of anything that has ever been successfully explained by advancing any theory like the theory of a multiverse. A multiverse explanation therefore has a singularly low credibility. One can compare it to a totally new type of machine that has never been proven to work before.

For the multiverse enthusiast, this is an insolvable dilemma. We can have no confidence in multiverse explanations until we can have a verified case of this type of explanation explaining *something*, but it is impossible to reasonably imagine anything ever getting a verified explanation through this type of explanation (whether it be our universe's fitness for life, or anything else).

6. A multiverse theory can "explain" any claim, no matter how absurd; as it can "explain" anything, it explains nothing

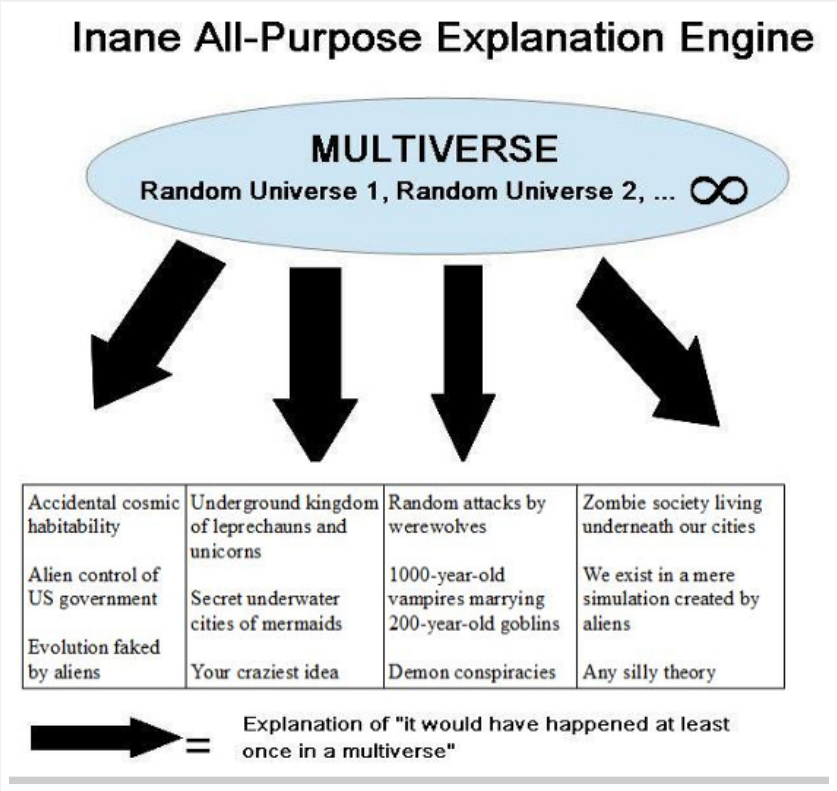
A multiverse theory is in fact a kind of inane all-purpose explanation engine. It can be used to “explain” almost any absurdity or any theory no matter how improbable.

Let's randomly imagine an absurd theory which I may call the alien deception theory. The theory is that evolution is false, and that all of the fossils we have found suggesting evolution were planted on our planet by aliens trying to fool us into believing that evolution occurred. A multiverse theory “proves” this alien deception theory to the exact same degree that it “proves” that our universe's favorable characteristics are due to an accident. Exactly the same reasoning may be given for both: even though it may seem very improbable that such a thing would occur, we would expect it to occur some times given a vast number of universes.

I could go on and on with similar examples. Basically whatever crazy theory you wish to believe in, you can justify with multiverse reasoning. Do you want to believe that underground is a vast kingdom of leprechauns, cute little people like those in Irish mythology? Do you want to believe that these little leprechauns are all riding along underground on little unicorns? You can get there with a multiverse. You simply reason that no matter how improbable such a thing may be, we would expect it to have occurred at least once if there are an infinite number of universes.

Similarly, whenever your eyes seem to tell you of some fact with great certainty, you can use multiverse reasoning to support the idea that what you are seeing is not really happening. If you are unlucky enough to walk up to your house and see it burning on fire, you can convince yourself that this is a hallucination. If you then think a normal person like yourself would never have such a hallucination, you can use multiverse reasoning to squash that objection. You simply reason that no matter how improbable it may be that a normal person would have such a hallucination, we would expect such a thing to occur many times if there are a vast collection of universes.

The graphic below visualizes my point that a multiverse can be used to “explain” any absurdity. A multiverse can be basically used to explain anything. That which explains anything explains nothing.



Postscript: See this paper by physicist V. Palonen. He makes the same point I made that the relevant consideration is the likelihood of this universe being habitable, not "some universe." Palonen writes:

It follows that because multiverse hypotheses do not predict fine-tuning for this particular universe any better than a single universe hypothesis, multiverse hypotheses are not adequate explanations for fine-tuning. Conversely, our data on cosmic fine-tuning does not lend support to the multiverse hypotheses. For physics in general, irrespective of whether there really is a multiverse or not, the common-sense result of the above discussion is that we should prefer those theories which best predict (for this or any universe) the phenomena we observe in our universe.

Posted by Mark Mahin at 9:12 AM No comments:

Labels: cosmic fine tuning, multiverse, scientific explanation, scientific explanations

Tuesday, March 10, 2015

If You Had Always Lived in a Random Universe

Humans seem to take for granted any law of nature that regularly acts to their benefit, no matter how wonderful such a law may be, and no matter how improbable such a law may seem from the standpoint of random actions of material particles.

To illustrate this point, let us imagine a different universe. In this universe there is a most amazing law called “the law of soft collisions.” So in this alternate universe, whenever anyone jumps out of a tall building, or falls from a high cliff, their speed starts to decrease at just the right time, causing them to gently land without suffering any damage. Also, when two cars travel directly towards each other at high speeds, their paths always divert at just the right time so that there is

no hard collision. (Please do not test whether this “law of soft collisions” works in our universe; I can assure you that it does not.)

If people had always lived in such a universe, would they regard this “law of soft collisions” as some evidence that their universe had been carefully designed? I think very many of them would not. Instead, they would simply take the law for granted – just as we take for granted the laws that make our existence possible. In such a universe we might see conversations such as the following.

Physics teacher: So, to review our lesson for today, it is a fundamental law of nature that nothing can ever collide violently. We call this “the law of soft collisions.” So, for example, when people jump out of skyscrapers they always land softly and safely. And there has never been a death from an automobile collision. And when people fire bullets at other people, the bullets always swerve away from their targets or slow down, so that no harm is ever done.
Student: My dad says that the “law of soft collisions” is so convenient that it may perhaps be a bit of an indication of some purpose or plan behind the universe.
Physics teacher: Sentimental nonsense! The “law of soft collisions” is simply the way that nature has always worked, a “brute fact” that we can no more “explain” than we can explain the laws of mathematics.

Returning to our universe, do we ever take for granted any laws that are as seemingly providential as this “law of soft collisions”? Yes, we do that all the time. The laws we take for granted are the laws of nature that make our existence possible. These laws include: the laws of nuclear physics that bind together protons and neutrons to become an atomic nucleus, the laws of gravitation that allows large bodies to form, the laws of electromagnetism that allow complex life to exist, the Pauli exclusion principle that makes solid matter possible, and also certain laws of quantum mechanics that allow the existence of atoms by making sure that electrons do not fall into the nucleus (something they would otherwise have a natural tendency to do because of the electromagnetic attraction between protons and electrons).

We inevitably take all of these wonderful things for granted, simply because they are part of the fabric of reality as we have always known it. It is hard for us to imagine any other reality. But suppose we try really hard to imagine a completely different reality. Let us make such an attempt, by trying to imagine what it would be like if you had always lived in a truly random universe.

In a truly random universe, there would be no convenient laws that cause matter to organize into galaxies, stars, planets, and atoms. So at first glance it seems impossible to imagine yourself living in such a universe, because biological life would be impossible. But let's get over this difficulty by cheating a little. You can simply imagine yourself as a disembodied spirit or energy floating around from place to place.

What would life be like for you in this utterly random universe? We cannot imagine you living in a house, or walking on the ground, because there would be none of the favorable laws of nature that make possible planets and solid matter. But you can at least imagine yourself floating around like a misty cloud drifting in the wind.

What kind of matter would there be around you in this random universe? There would be only disorganized matter drifting about. The closest thing in our universe to such matter would be the disorganized matter that drifts about in a gaseous nebula like the one shown below.

Occasionally such drifting matter might form into interesting random concentrations, although nothing too interesting because of the lack of gravity. But you would not be able to appreciate even these mildly interesting concentrations of random matter. This is because there would be no sunlight or starlight anywhere in your random universe. Sunlight and starlight both requires stars, and stars require many favorable laws and some fine-tuned constants, which would not exist in your random universe.

So you would not be able to see anything in this random universe as you drifted randomly from place to place. For you there would be no home, no solid matter, no beauty to appreciate. You would be like some blind cloud drifting around in a moonless night sky, being tossed around by dark, random forces. Life would be very, very dull.

Now let us imagine that after living many years in such a blind, drifting existence in a dark random universe, you suddenly found yourself transformed into a material being standing on the surface of a solid planet. If you then learned about the laws that made possible this orderly material universe, you would have the greatest appreciation for such laws that you had only just started to experience, regarding them as numinous marvels infinitely more amazing than having a huge monarch butterfly drift through your open window every day of the summer.

But we can never have any such appreciation ourselves. We instead will always utterly "take for granted" whatever favorable laws exist in our universe, no matter how improbable or providential they may be.

Posted by Mark Mahin at 11:28 AM No comments:

Labels: cosmic fine tuning, laws of nature, random universes

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Sunday, February 22, 2015

50 Things Science Cannot Explain, Part 1

Science is a good and great thing, and it is very good at explaining quite a few things, such as the production of energy by the sun, the appearance of volcanoes and tsunamis, and the details of biological reproduction. Some like to think that science has an explanation for almost everything. But this is far from the truth. In reality, there are many things that science has no credible explanation for. In this four-part series of blog posts, I will list 50 such things.

#1 The origin of the universe (the Big Bang)

Scientists say the universe began in an incredibly hot and dense state (supposedly an infinitely dense singularity). But they have no explanation at all for what may have caused this event. The only attempts to explain this event have been purely speculative.

#2 The existence of matter rather than just energy

Scientists say the Big Bang should have produced equal amounts of matter and antimatter. When a matter particle comes into contact with an antimatter particle, both are converted into pure energy (photons). Scientists say that given the incredible density at the Big Bang, all of the universe's matter particles should have combined with antimatter particles, leaving a universe with nothing but energy. But instead we have a universe in which there is lots of matter, but no detectable antimatter. Scientists call this puzzle the mystery of matter/antimatter asymmetry. Scientists have been scratching their heads over this issue for decades, but don't seem to be getting anywhere in solving it.

#3 Extrasensory perception

As discussed in this post, very strong evidence has been gathered over more than 80 years for the existence of extrasensory perception. Much of this evidence has been

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▶ July (8)
▶ June (8)
▶ May (8)
▶ April (8)
▶ March (9)

gathered under carefully controlled scientific conditions that meet all the standards of modern experimental science. Science offers no explanation for why the human mind should have such an ability. Many a modern scientist prefers to simply deny that there is any evidence for the phenomenon, despite the accumulation of a mountain of evidence for its existence, both laboratory evidence and quite common anecdotal evidence.

#4 The origin of life from chemicals

Scientists say that the first life consisted of self-replicating molecules simpler than cells. But scientists have no explanation for the origin of the first self-replicating molecules. Scientists have been trying for decades to figure out how simpler chemical compounds could have developed into self-replicating molecules, but have made little progress on this matter. Part of the problem is that the main way of explaining the development of complexity is biological evolution. But before there were self-replicating molecules, there could have been no biological evolution. So biological evolution can't explain the origin of the first self-replicating molecules.

#5 The origin of the genetic code

In order for life to begin, you need not merely self-replicating molecules, but the genetic code, which is kind of a simple language used in the production of proteins. The origin of this genetic code is an unexplained mystery.

#6 Apparitions

Although skeptics may say that ghost sightings are a relic of the past, all available evidence is that apparition sightings are not any less frequent now than in the past. There is evidence that a significant fraction of humanity may have experienced an apparition sighting or a similar experience. What does modern science have to say about this phenomenon? Virtually nothing. There is no prevailing theory to explain away such sightings. The simplest natural explanation – hallucinations – is not credible, because apparitions seem to be experienced by such a significant fraction of the population, most of whom have no psychiatric symptoms. Nor can one plausibly explain apparitions as hallucinations caused by fear, as there is no evidence that fear produces hallucinations; and apparitions often are reported as sudden appearances by people who are not afraid.

#7 The existence of consciousness

The origin of consciousness is the problem of how it is that consciousness could have originated long ago from mere protoplasm. To a person who is a reductionist, and who believes

- February (7)
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- 2019 (95)
- 2018 (93)
- 2017 (92)
- 2016 (92)
- 2015 (97)
- 2014 (163)
- 2013 (166)

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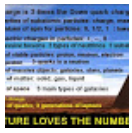
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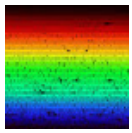
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that all human consciousness is merely a chemical and electrical by-product of the brain, this problem may not seem like much of a mystery. But the origin of consciousness has seemed like quite a mystery to those who have considered how different Mind is from matter. To some, the idea of mind arising from mere matter seems as hard to explain as the inverse (the idea of matter arising from mere mind, as might happen if you thought into existence an apple).

Here is another way to consider the mystery of the origin of consciousness. Let us define a philosophical zombie (for lack of a better term) as a person who acts like a human but has no real inner consciousness or self or private thoughts or inner emotions. We can imagine a race of such beings existing on our planet rather than human beings. Biologically, such a race seems every bit as plausible to exist as the human race (or even more so, since less is required from the brain). So why doesn't such a race exist rather than our race? Science has no answer.

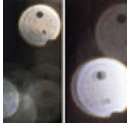
#8 Why there is something rather than nothing

The mystery of existence is simply the mystery of why anything exists at all. In other words, why is there something rather than nothing? The simplest possible state of existence is eternal absolute nonexistence: a state in which nothing exists (no God, no universe, nothing). So why did not this elegantly simple state of existence (the state of absolute nothingness) prevail, rather than our messy, complicated universe? You can't answer the question by imagining (in a quantum mechanical way) that a vacuum is unstable, because an unstable quantum mechanical vacuum is something, rather than nothing, and the question is why something exists rather than nothing.

It would seem that we cannot have the slightest hope that science will ever be able to solve this problem. We cannot hope that science might discover something such as some natural law that guarantees the existence of something, because such a natural law would itself be something in need of explanation; and we could always ask why was there not any such natural law, and not anything else?

#9 Near death experiences

For decades people who came close to death have been reporting amazing experiences involving things such as seeming to float out of their bodies, traveling through some mysterious tunnel, encountering a Being of light, and encountering dead relatives. Quite a few examples can be found here. Science has no good explanation for this phenomenon. We cannot plausibly explain near-death experiences by assuming oxygen deprivation, because we have plenty of accounts of pilots and mountain climbers who experienced oxygen deprivation, and



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the effects reported do not strongly resemble those of near death experiences. We also cannot explain near-death experiences as being the result of drugs, as no known drug given to dying people produces similar accounts, and the accounts often occur when people have not recently been given drugs.

#10 The fine-tuning of nuclear physics

This article yesterday gave a good overview of the work of a scientist who has done computer simulations to help answer the question: how big a change in some fundamental physical constants (the quark masses and what is called the fine structure constant) would mess things up so that the universe wouldn't have abundant amounts of carbon and oxygen (both requirements for living things)? The scientist came up with an answer of about 2 percent. It seems that our universe is fine-tuned so that it has two of the prerequisites of living things, abundant amounts of carbon and oxygen.

Scientists have no explanation for this example of cosmic fine-tuning. I am not counting the idea of a multiverse (the possibility of some huge collection of universes) as an explanation. Since we have no verified example of anything ever being explained by the assumption of a huge collection of universes, a multiverse explanation is disreputable. Because it is unverifiable, the idea of a vast set of other universes is not really a scientific explanation, but a metaphysical type of claim. Also, we wouldn't explain fine-tuning in this universe by assuming the existence of many other universes, because the existence of such other universes would not make it any more likely that this particular universe would have the characteristics needed for life.

#11 The more dramatic cases of table tipping

Table tipping was hugely popular during some years in the nineteenth century. A group of people would often get together, lay their hands gently on a table, and find after a while that the table would start moving about or tilting. Spiritualists said this was evidence of intervention by spirits of the dead, although an alternate paranormal explanation is that somehow a group of people acting together can produce a small psychokinetic “mind over matter” effect. Skeptics may say that table tipping is no longer observed, but that's not correct. On www.youtube.com if you search for “table tipping” you can find 17,000 videos, some of which are very spectacular.

Science has no real explanation for the more dramatic cases of table tipping. There is a theory that something called the “ideomoter effect” causes people to subconsciously move tables while having their finger tips on top of them. But while such a theory might account for a little bit of movement of a very light

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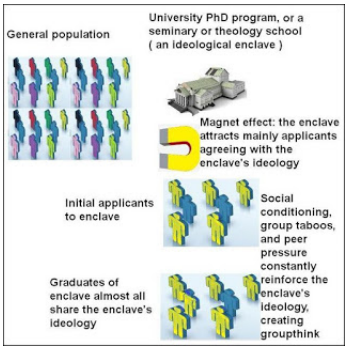
Why a Clique of Scientists Might Do Worse at Judging Truth Than a Jury

When newly awarded PhD's start writing papers and books and judging truth, they are rather like jurors who have been methodically expos...



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Labels

- 3D printing (1)
- abundance (1)
- acupuncture (1)

table, such a theory cannot explain the more dramatic cases of table tipping shown on www.youtube.com, which show tables (sometimes heavy ones) dramatically moving about when people simply lightly lay their finger tips on top of them.

#12 The existence and persistence of spiral galaxies

There are two great marvels to appreciate in the fact that we look out and see so many spiral galaxies in the universe. The first marvel is that any spiral galaxies should even have formed after the Big Bang. One would expect that an inconceivably violent explosive event such as the Big Bang should have produced only the wreckage of a universe, not a universe in which beautiful and orderly spiral galaxies are abundant. Scientists know that certain parameters such as the gravitational constant had to be just right for galaxies to have formed.

Spiral galaxy M101 (Credit: NASA)

The other great marvel involving these spiral galaxies is that they have continued to exist for billions of years. There is an unsolved problem called the winding problem, which is that the rotation of spiral galaxies should cause them to lose their spiral shape after only a few rotations, which would occur in about 600 million years. But somehow spiral galaxies have persisted for a period more than 10 times longer, for more than 10 billion years. There is currently no adequate scientific explanation for this.

#13 The more dramatic cases of unidentified flying objects

Reports of astonishing UFOs in the sky have continued for more than 50 years, and there are many dramatic photos and videos to substantiate the phenomenon. Does science offer any natural explanation? It can only explain the less dramatic cases. Explanations such as “seeing Venus” or “swamp gas” or “reflections in the windshield” cannot explain very bright UFOs seen outside of a car far away from a swamp.

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

But what about the simple explanation that UFOs really are alien spacecraft from another planet? Isn't that a good scientific explanation for UFO's? But the problem is that it is often reported that UFOs accelerated at enormous speeds that would kill any life forms in them. Also, if UFOs are from some other planet, how come astronomers cannot seem to detect any extraterrestrial "mother ship" out in outer space?

So we must also put down UFO's as something science cannot currently explain.

In my next post on this blog, I will describe 12 or 13 additional things science cannot explain; and by the time the 4-part series is over, 50 such items will be listed.

Posted by Mark Mahin at 11:36 AM No comments:

Labels: cosmic fine tuning, cosmology, origin of life, origin of Mind, paranormal phenomena, scientific explanations, things science cannot explain

Wednesday, January 28, 2015

The Professor's Fallacious Critique of Cosmic Fine Tuning

A recent article in the Wall Street Journal was entitled "Science Increasingly Making the Case for God." The article seems to have mixed up some solid points based on modern physics with some dubious arguments based on a misguided idea that the Earth or earthly life is some possibly unique cosmic miracle. The article was rebutted by physicist Lawrence Krauss in this New Yorker article. But in rebutting an opinion piece that seems to have had some logic errors mixed up with a good deal of truth, Krauss has given us a rebuttal that itself is a mixture of some truth and some serious errors of fact and reasoning.

Krauss discusses the origin of life, and he assures us that the building blocks for the first living things are abundant in space. "We have continued to find in space the more sophisticated components associated with the evolution of life on Earth." This statement includes a link to a news article. But when I follow the link and read the article, I don't find anything that backs up the claim. The linked article refers to the discovery of space chemicals, and says, "Chemicals they found in that cloud include a molecule thought to be a precursor to a key component of DNA and another that may have a role in the formation of the amino acid alanine." But that's a giant leap away from finding "the more sophisticated components associated with the evolution of life on Earth." The article merely discusses the discovery of distant precursors of some of the parts of the key molecules of life – rather like finding sand that is a distant precursor of the silicon chips in your computer. In fact, we have not actually found in space "the more sophisticated components associated with the evolution of life on Earth," but only some relatively simple precursors. Krauss is also on very weak ground when he discusses some speculative theory of an MIT scientist, one that has neither experiments nor observations to back it up.

Krauss attempts to rebut arguments that the fundamental constants of the universe are fine-tuned, as if some cosmic designer had chosen them. Krauss says the following:

The constants of the universe indeed allow the existence of life as we know it. However, it is much more likely that life is tuned to the universe rather than the other way around. We survive on Earth in part because Earth's gravity keeps us from floating off. But the strength of gravity selects a planet like Earth, among the

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

variety of planets, to be habitable for life forms like us.

Here Krauss commits the logical fallacy known as presenting a false dilemma. A false dilemma is when a reasoner speaks as if we must choose between two different things, even though the two things are not mutually exclusive. It's the type of reasoning error committed when someone says something like, "You can either be a true patriot or a Democrat – make up your mind," without explaining why one can't be both. The false dilemma Krauss presents is the idea that we need to make a choice between the idea that the universe is fine-tuned for life and the idea that life is fine-tuned to the universe's laws. There is not the slightest reason to make such a choice, as the two ideas are not in any way mutually exclusive. Since it is perfectly possible that we have both a universe that is fine-tuned for life, as well as biological life that is fine-tuned to the laws and realities of the universe, the second of these ideas does nothing at all to undermine the credibility of the first idea.

Krauss then discusses the issue of the fine-tuning of the cosmological constant, something I discuss in this blog post. Scientists say that because of the strange facts of quantum mechanics, the vacuum between stars should be teeming with energy, as what are called virtual particles constantly pop in and out of existence. Quantum field theory allows us to calculate how much energy there should be in the vacuum of space because of these virtual particles. The problem is that when scientists do the calculations, they get a number that is ridiculously wrong. According to this page of a UCLA astronomer, quantum field theory gives a prediction that every cubic centimeter of the vacuum should have an energy density of 10^{91} grams. This number is 10 followed by 90 zeroes. That is an amount trillions of times greater than the mass of the entire observable universe, which is estimated to be only about 10^{56} grams.

Another name for this vacuum energy density is the cosmological constant. We know that this cosmological constant is not the ridiculously high number predicted by physicists, but some some very, very low number (although apparently non-zero). Scientists speculate that there may be some "accidental cancellation" of all these strange quantum factors that leaves us with a cosmological constant very close to zero. But in order for you to have that, it would have to be an astonishingly improbable coincidence – kind of like the coincidence you would have if you added up all the purchases of everyone in China, and subtracted from them all of the earnings of every one in the United States, and ended up with a number less than 100 dollars. We would not expect that such a lucky coincidence would occur in even 1 in a billion trillion quadrillion random universes, as it requires fine-tuning to more than one 1 part in 1,000,000,000,000,000,000,000,000,000,000,000,000.000.

Here is how Krauss attempts to explain away this "vacuum miracle" as I have called it. He says this about the cosmological constant:

Is this a clear example of design? Of course not. If it were zero, which would be "natural" from a theoretical perspective, the universe would in fact be more hospitable to life. If the cosmological constant were different, perhaps vastly different kinds of life might have arisen. Moreover, arguing that God exists because many cosmic mysteries remain is intellectually lazy in the extreme.

There are four fallacies or misstatements in this short statement, and let me carefully describe each of them.

First, it is not at all true that a cosmological constant of zero is " 'natural' from a theoretical perspective." As many scientists have stated, from the perspective of quantum mechanics, a small or zero cosmological constant is shockingly unnatural and a wildly improbable thing, like the chance of the total salaries of all Americans accidentally exactly or almost exactly equaling the total annual purchases of all Chinese people.

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

Second, let's look at Krauss' claim that the universe "would be more hospitable to life" if the cosmological constant were zero. There is actually no solid basis for this claim. The only scientific paper I can find advancing such a thesis is a very iffy speculative paper that is meekly entitled, "Preliminary Inconclusive Hint of Evidence Against Optimal Fine Tuning of the Cosmological Constant for Maximizing the Fraction of Baryons Becoming Life." The paper can be read here. The author of this paper (Don N. Page) argues that you might have a "very small increase" in life in the universe if the cosmological constant was zero. But he seems to have no real confidence in his thesis. Referring to other scientists, he says in his paper, "Email comments by Robert Mann, Michael Salem, and Martin Rees have shown me that it is not at all clear that the very small increase in the fraction of baryons that would condense into galaxies if the cosmological constant were zero instead of its tiny observed positive value would also lead to an increase in the fraction of baryons that would go into life." Page also points out that another scientist suggests the universe would be *less* habitable to life if the cosmological constant were lower.

So there is no solid basis at all for Krauss' claim that the universe "would be more hospitable to life" if the cosmological constant were zero – merely a super-iffy unsubstantiated speculation that it might be *slightly* more hospitable to life, a speculation other scientists dispute. Also, even if you were to get somewhat more life in a universe with a zero cosmological constant, it would still appear to be a case of enormous fine-tuning to get a cosmological constant as low as ours, given the vacuum energy density issue discussed above, and the need for all these quantum contributions to the vacuum to miraculously cancel each other out. One does not disprove a case of fine-tuning by showing that a slightly better result could have been achieved. For example, if I buy you a ticket to a hot Broadway show, and get you a seat in the middle of the second row, that is a type of fine-tuning – and you don't show it isn't fine-tuning by arguing that I could have got you a seat in the middle of the first row.

Third, in the statement above Krauss argues, "If the cosmological constant were different, perhaps vastly different kinds of life might have arisen." No, that doesn't work to explain away this issue. The issue with the cosmological constant is that if you don't have fine-tuning to more than 1 part in 1,000,000,000,000,000,000,000, then you get no galaxies, no stars, and empty space that is a seething super-dense quantum vacuum with much more mass-energy than the density of solid steel. Under such conditions, no life of any type is possible, no matter how weird it may be.

Fourth, Krauss is using a "straw man" argument when he says that this type of reasoning is "arguing that God exists because many cosmic mysteries remain." That's not what is going on when people use the cosmological constant (and similar cases of cosmic fine-tuning) to suggest that there is a purpose and plan behind the universe. It is instead a case of reasoning from an extreme case of fine tuning to the likelihood of a fine-tuner, not a case of arguing from the mere existence of cosmic mysteries. One would have a case of "arguing that God exists because many cosmic mysteries remain," if one used silly reasoning such as "blacks holes and quasars are mysterious, so God probably exists." But I am not aware of anyone using such reasoning.

Krauss then wraps up his comments with that old skeptic's slogan that extraordinary claims require extraordinary evidence, which is kind of an all purpose excuse for not believing in anything you don't want to believe, no matter how much evidence piles up. First, of all it should be noted that "extraordinary claims require extraordinary evidence" is an inappropriate slogan, similar to claims such as "Bald men require bald wives," and "Stupid people require stupid leaders." Imagine if I claimed that John Riser had levitated twenty feet into the air in the middle of the street. That would be an extraordinary claim, but I would not necessarily need any extraordinary evidence to show its likelihood. I could show its likelihood through ordinary, common type of evidence such as the sworn testimony of 20 reliable impartial witnesses, or live television camera footage

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

taken by two different network television cameramen. A much better slogan is, "Extraordinary claims require good, convincing evidence, whether it be a common type of evidence or an unusual type of evidence."

I may also note that the evidence for the fine-tuning of fundamental constants *is* extraordinary, involving the work of many scientists over a period of decades, regarding the fundamental traits of physical reality. How is this not extraordinary?

To read more about the topic of cosmic fine-tuning, with many good examples, read my blog posts here and here. The first of these posts explains the color-coded table below, which summarizes lots of requirements for the existence of civilized creatures such as us.

Item	Requirements (Direct or Indirect)
Higgs field	Fine-tuning to 15 decimal places
Up quark, down quark, electrons	Currently unexplained matter/antimatter asymmetry, Higgs field
protons, neutrons	up quark, down quark
hydrogen atoms	protons, electrons, electromagnetic force
Galaxies	Fine-tuning of expansion rate, density perturbations, dark energy, dark matter, photon/baryon ratio, gravitation
carbon atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing carbon in stars
Oxygen atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing oxygen in stars, weak force
Heavier atoms (with more than about 25 protons)	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong force, weak nuclear force and neutrinos causing supernovae
Sunlike stars	Galaxies, fine-tuning of (1) gravitation (2) electron mass (3) Planck's constant (4) speed of light
water	Oxygen atoms, hydrogen atoms
Stable planets	Gravitation, equality of proton charge and electron charge to many decimal places (for planet to hold together)
Nucleotides	oxygen atoms, carbon atoms, molecular bonding requirements
Genetic code	Huge enigmatic requirement -- "programming code from chemicals"
RNA	Nucleotides, Genetic code, water
DNA	RNA, nucleotides, Genetic code, water
Proteins, cells	DNA, RNA, Genetic code, water
Photosynthesis	Exotic quantum effects
Civilizations near sunlike stars	Heavier atoms, sunlike stars, stable planets, proteins, cells, photosynthesis, important unknown other requirements allowing Mind to arise from matter

Posted by Mark Mahin at 8:59 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmological constant, cosmology

Wednesday, January 7, 2015

The Laws of Nature Are Mainly Quasi-teleological

Scientists study the laws of nature in great detail, but it is relatively rare for anyone to attempt a qualitative assessment of the laws of nature. We might do such a thing by imagining three different quality categories. If a law of nature seems to serve a good purpose, we might call that law quasi-teleological, a term that means "as if it was intended for a purpose." If a law of nature seems to serve a bad purpose, we might call it dysteleological, a term that means "as if it was intended for a bad purpose." If a law of nature seems to serve no purpose either good or bad, we can simply call it neutral.

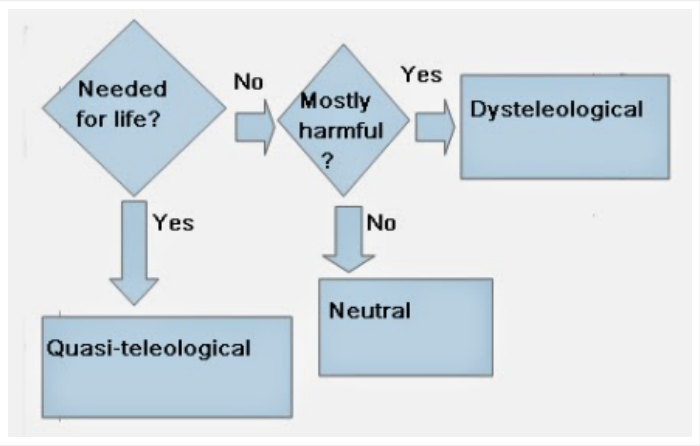
- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

Let us attempt to judge whether the most important laws of nature fall into any of these three categories. One way to do that it is to make judgments based on random incidents, or incidents chosen to support a particular viewpoint. You would be following that approach if you made statements like this:

I just heard that someone was struck dead by lightning. Damn that awful law of electromagnetism! It's so harmful.

I was hiking yesterday in the mountains, and hurt my leg when I slipped and fell. Damn that stupid law of gravity! It's such a terrible law.

Making assessments of laws of nature based on incidental experiences such as this does not make any sense. What we need is an intelligent general-purpose algorithm for assessing whether a law of nature is quasi-teleological, neutral, or dysteleological. I propose the algorithm shown in the flowchart below.



The algorithm starts by asking: is the law of nature necessary (directly or indirectly) for the existence of living things such as ourselves? If the answer to question is "Yes," the law is considered quasi-teleological, because it helps to achieve a good purpose (the purpose of allowing creatures such as us to exist). If the answer is "No," the algorithm then asks whether the law of nature is mostly harmful in its effects. If the answer to that second question is "Yes," the law of nature should be considered dysteleological (a law that serves a bad purpose). If the answer to that question is "No," the law is considered to be neutral (meaning that it neither seems to serve a good purpose, nor seems to serve a bad purpose).

Let's try a simple example, and see whether the algorithm seems to make sense. Consider the case of the law of gravitation, the universal law of nature that there is a force of attraction between all massive bodies, directly proportional to the product of their masses, and inversely proportional to the square of the distance between them. Gravitation is (indirectly) absolutely necessary for the existence of living beings, because if it were not for gravitation we would have neither a planet to live on, nor a sun to produce warmth. So even though occasionally gravity produces deaths from falling, the fact that gravitation is absolutely necessary for planets decisively trumps all other considerations. It is therefore absolutely correct for us to consider gravitation as a quasi-teleological law. It serves the good purpose of allowing the existence of planets for living things to exist on. In this case the algorithm seems to steer us to the right answer.

Let us apply the same algorithm to other major laws of nature. Another major law of nature is Coulomb's law (the basic law of electromagnetism). This is the law that between all electrical charges there is a force of attraction or repulsion, directly proportional to the product of their charges, and inversely proportional to the square of the distance between them. It is true that very rarely this law helps to kill people in lightning strikes, but that fact is absolutely trumped by the fact that living things could not exist for even a minute without Coulomb's law. Electromagnetism is what makes chemistry possible, and without chemistry we

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

would all instantly die. If you were to turn off Coulomb's law, our bodies would quickly disintegrate. So again, using the above algorithm, we must classify Coulomb's law as a quasi-teleological law, as it serves the good purpose of allowing the existence of biological organisms.

The table below shows a list of fundamental laws of nature. Most of the laws have commonly used names, but some very important laws do not have any common name, although they should have one. One of the most important laws is one I have designated below as the Law of the Five Allowed Stable Particles. This is simply the law that rather than producing hundreds or thousands of different types of stable particles from a high-energy particle collision, nature makes sure that only five types of stable particles result. Although not important now, the current arrangement of matter in the universe would be hopelessly different (in a very negative way) if such a law had not applied shortly after the Big Bang, when all the particles in the universe were colliding together at high speeds. You can say the same about the other conservation laws listed below.

Law	Description
law of gravitation	All massive particles have a degree of attraction towards each other proportional to the universal gravitational constant
Coulomb's law	There is a force of repulsion between particles with the same type of electric charge, and a force of attraction between particles with different types of electric charge
law of the strong nuclear force	Protons and neutrons have an incredibly strong glue-like force between each other, whenever they come very close to each other
Law of the Five Allowed Stable Particles	High-speed collisions of subatomic particles always produce only five types of stable output particles: protons, neutrons, electrons (each with a specific rest mass and charge), photons, and neutrinos
Pauli Exclusion Principle	No two electrons in an atom can have the same quantum state
law of the conservation of charge	The ratio between the proton-like charges (called "positive") and the electron-like charges (called "negative") in the outputs of a subatomic particle collision must be the same as the ratio was in the inputs of the collision
law of the conservation of baryon number	Using the term "total baryon number" to mean the total of the protons and neutrons (minus the total of the antiprotons and antineutrons), the total baryon number of the stable outputs of a subatomic particle collision must be the same as the total baryon number was in the inputs of the collision
Laws of quantum mechanics	Laws that restrict the energy states of electron orbitals, thereby preventing electrons from falling into atomic nucleus

All of these laws have one thing in common: for various reasons, all of them are necessary for the existence of life. In the case of the law of the strong nuclear force, the Pauli exclusion principle, and the law of electromagnetism, this is glaringly obvious, as we couldn't exist for even a minute if these laws didn't exist. In the case of the law of gravitation, it's almost as obvious that it is required for life, as gravitation is absolutely necessary for the existence of planets. In the case of the law of the conservation of baryon number, this college physics textbook says, "if it were not for the law of the conservation of baryon number, a proton could decay into a positron and a neutral pion." If such a decay were possible, there wouldn't be any protons around by now, nor would there be any life.

In the case of the law of the conservation of charge, the law guarantees that electrons are stable particles that cannot decay into neutrinos, and thereby assures that we have a universe with plenty of the electrons needed for atoms and life. In

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

the case of the laws of quantum mechanics, we have laws that restrict the states that electrons can take inside an atom, and thereby prevent electrons from falling into the nucleus of an atom (something they would otherwise have a strong tendency to do because of the very strong electromagnetic attraction between protons and electrons).

As all of these laws are needed for life, we must characterize all of them as quasi-teleological. But other laws of nature should be classified as neutral, because they do not seem to have any bad effect nor any good effect.

Although the modern materialist scientist may attempt to banish teleology from nature, such an attempt is not at all supported by his subject matter. The quasi-teleological nature of the main laws of nature present a huge problem for those who wish to believe in a capricious universe whose characteristics are the result of blind chance. Such people have not only the huge problem of explaining the universe's fine-tuned fundamental constants, but also the problem of explaining the universe's fine-tuned laws.

Posted by Mark Mahin at 9:23 AM No comments:

Labels: cosmic fine tuning, laws of nature, teleology

Sunday, January 4, 2015

Threading the Needle Holes of Cosmic Habitability

In the new book *The Improbability Principle,* mathematician David J. Hand looks at the issue of apparent cosmic fine-tuning, the many ways in which the universe seems to be tailor-made for the existence of intelligent beings such as us. Hand attempts to explain this away in keeping with his overall thesis that we should not be surprised when incredibly improbable things happen.

Hand looks at the fact that the existence of stars requires an exquisite balance between two of the fundamental forces of the universe, the gravitational force and the electromagnetic force. He suggests that thinking there is such a balance results from the mistake of considering that just one of the two has been fine-tuned to just the right value. When we consider the possibility of both varying, Hand suggests, then the situation is not so amazing. As Hand says on page 214-215 of his book:

We saw that changing the value of either one of these values would mean that the universe would not be suitable for life. But what if we changed them both? What if we increased the electromagnetic force a little, to match the increase in the gravitational force? Do this approximately, and the equilibrium within stars is maintained, so perhaps planets still form and life evolve. Fine-tuning, yes, but with much, much more scope for a pair of values which will lead to life than if the forces must separately take highly specific values.

Hand's reasoning is incorrect. When we have a case in which two fundamental constants of nature are exquisitely balanced, there is no greater likelihood that both will balance if we allow for the possibility of both of them varying. We can see this clearly by considering the case of the proton charge and the electron charge.

There is an exquisite and unexplained balance between the proton charge and the electron charge, in that all protons have a charge of exactly $1.602176565 \times 10^{-19}$ coulomb, and all electrons have a charge of exactly $-1.602176565 \times 10^{-19}$ coulomb (which is quite amazing given that each proton has a mass 1836 times greater than the mass of each electron). As the astronomer Greenstein has pointed out, there are reasons why stars and planets would not be able to exist if the absolute value of the proton charge and the electron charge differed by even 1 part in 1,000,000,000,000,000,000. Since electromagnetism is a force more than a

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

trillion trillion trillion times greater than the gravitational force, even a tiny change in either the proton charge or the electron charge would mean that electromagnetic effects acting on a large body would overwhelm gravitational effects, and gravitation would be insufficient to keep stars and planets together.

But suppose we imagine random changes in both the electron charge and the proton charge. Would that increase the probability of the two of them matching in the way that is necessary for stars and planets to hold together? No, it wouldn't. If we imagine both constants randomly changing, it is true that this would open up many new possibilities that might be compatible with the existence of stars and planets, such as one in which the proton charge was 3.378921×10^{-12} coulomb and the electron charge was an exactly opposite value of $-3.378921 \times 10^{-12}$ coulomb. But the overall likelihood of an exact match when both constants vary is not any greater than if one allows only one constant to vary.

Similarly, imagine I am playing a casino "million dollar jackpot" game of chance, and start with one random number between 1 and a million. To win, I have to get from the casino another number that matches the first number. If only the second number varies, the chance of success is 1 in a million. Now the casino employee may tell me: increase your chances by letting both numbers be random. But that's a fallacy – my chances of success will not be increased. The probability of getting a match if you start with one number and then get a random number is 1 in a million. The probability of getting a match if you get two random numbers is one million out of a trillion (because there are one million possible matches of two numbers between 1 and a million, and a trillion different possible combinations of two numbers between 1 and a million). But one million out of a trillion is a probability exactly the same as 1 in a million.

Hand then asks us to consider another possibility – that there may be some hidden reason why a change in one fundamental constant might cause a corresponding change in another very different fundamental constant. This might help to explain the exquisite balances within nature, Hand suggests. But this suggestion is an appeal to an imaginary possibility, and Hand provides no facts to back up such a suggestion. To the best of our knowledge, fundamental constants on which life depends (such as the speed of light, the gravitational constant, Planck's constant, the proton charge, and the electron charge) are entirely independent. There's no reason to think that having one such constant be compatible with life would increase the chance that other such constants would be compatible with life.

Hand tries to pass off his groundless imaginary idea as an example of what he calls the "law of the probability lever." Similarly, if a husband had failed to save enough money for retirement, and his wife complained, the husband could imagine that fairies will give him a million dollars when he reaches the age of 62, and he might call such a fantasy "the law of the fairy contributions." Imaginary concepts for which there is no factual basis should not be referred to as laws.

Hand then refers to a scientific paper in which one physicist claimed to show that it's not all that unlikely that stars should exist in random universes. Hand summarizes the paper by Adams as follows:

Fred C. Adams, of the Michigan Center for Theoretical Physics, investigated varying the gravitational constant, the fine-structure constant, and a constant determining nuclear reaction rates. He found that about a quarter of all possible triples of these three values led to stars which would maintain nuclear fusion – like the stars in our universe. As he said, "[We] conclude that universes with stars are not especially rare (contrary to previous claims)."

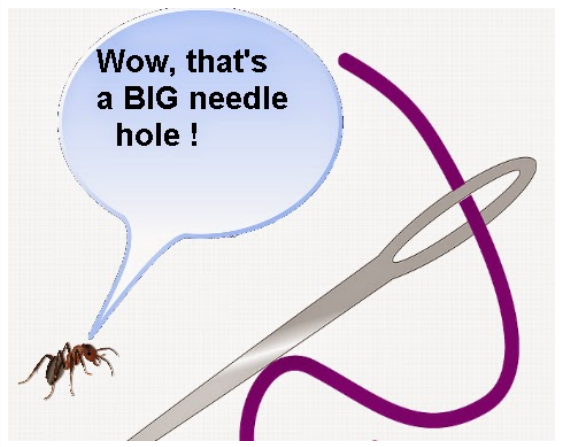
The previous claims Adams referred to are numerous claims made in the scientific literature along the lines that the chance is incredibly low of a random universe allowing stars like ours. There are some reasons why such claims were actually correct, and why Adams is wrong on this issue.

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

The first reason is that to have any stars at all you need to have a fine-tuning of not just the three constants Adams considered, but other constants he did not consider. For example, Adams completely fails to consider the very precise match between the proton charge and the electron charge needed for the stability of large bodies like planets and stars (previously discussed), a match that would not occur by chance in 1 in 1,000,000,000,000 universes in the parameter space he considers.

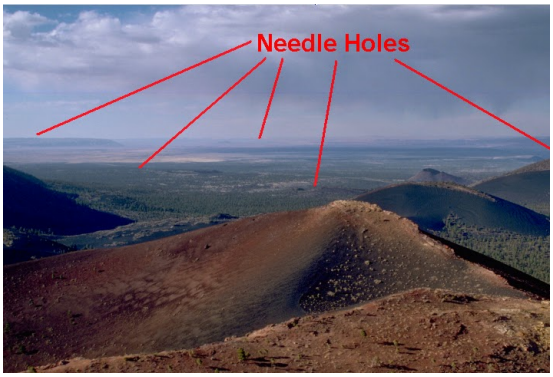
The second reason is that the real question is not the likelihood of some type of stars, but yellow stars like the sun, which offer better prospects for the evolution of intelligent life than other types of stars such as red dwarfs or blue giants. Scientists such as Paul Davies have concluded that very small changes in the fundamental constants would preclude the existence of stars like the sun. It's kind of like this: nature must thread one needle hole for there to exist some type of stars, but nature must thread a much tinier needle hole for there to be stars like the sun.

The third reason is that Adams is guilty of a fallacy that we might call the fallacy of the "ant near the needle hole." Consider an ant that somehow wanders into your sewing kit. If it were smart enough to talk, the ant might look at the eye of a needle hole in your sewing kit, and say, "Wow, that's a big needle hole!" Such an observation will only be made if you have a perspective looking a few millimeters away from the needle hole.



Similarly, Adams has given us graphs in which his "camera" is placed a few millimeters from the needle hole that must be threaded for stars to exist. He has imagined a parameter space in which fundamental constants are merely tripled. But physicists routinely deal with a difference of 40 orders of magnitude (10,000,000,000,000,000,000,000,000,000,000,000,000,000), which, for example, is roughly the difference between the strength of the strong nuclear force and the gravitational force. So if we are imagining a parameter space of alternate universes, we must imagine a parameter space infinitely larger than the relatively microscopic parameter space Adams considered. Rather than just imagining a possible tripling of the fundamental constants Adams considers, we should imagine that any of them could vary by a trillion times or a quadrillion times or a quintillion times.

Taking that correct perspective, we can see how marvelous it was that nature managed to thread the needle holes necessary for our existence. You can visualize it this way. The parameter space is the vast Sahara desert. The needle holes that nature needed to thread for a habitable universe are in different random positions scattered throughout that vast desert. The likelihood of those needle holes being threaded successfully by chance is therefore infinitely smaller than the probability figure reached by Adams.



Posted by Mark Mahin at 2:42 PM No comments:

Labels: cosmic fine tuning, cosmology, fundamental constants

Wednesday, June 25, 2014

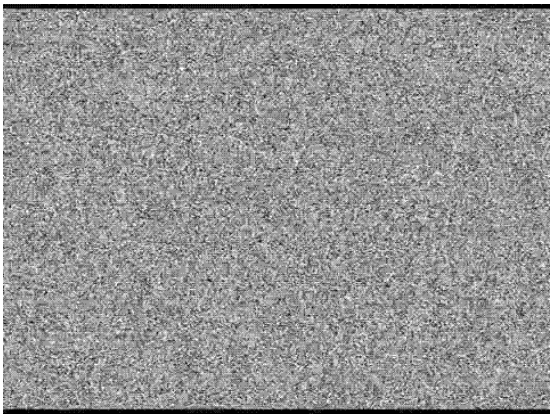
"Vacuum Catastrophe" Should Be Called the Vacuum Miracle

We tend to think of science as something that gives us the right answers. Almost always science does give us the right answer. But there is at least one case when science gives us the wrong answer – a *really, really* wrong answer. In fact, there is one case in which science gives us an answer wronger than any answer that you ever gave in school, even on those tests when you wrote wild guesses on your exam sheet because you had daydreamed through every class session.

The wrong answer given by science is the answer that it gives to the question: how much energy is in a vacuum?

A person not familiar with quantum mechanics tends to think of a vacuum as being just empty space. But according to quantum mechanics, empty space is not really empty. It is instead a seething froth of very short-lived particles called virtual particles. A virtual particle with mass is a particle that pops into existence and then pops out of existence a tiny fraction of a second later. Scientist think that the vacuum is filled with virtual particles corresponding to every type of actual subatomic particle that has been discovered. For example, they think that the vacuum includes incredibly short-lived virtual electrons, and incredibly short-lived virtual quarks (because both electrons and quarks are known types of subatomic particles).

You can get an idea of the modern concept of the vacuum by looking at the animation below. Each of the fleeting little specks represents one of the virtual particles that pop into existence, disappearing a fraction of a second later.



Imagine if there was a weird rule in your living room that every second 10,000 fireflies had to pop into existence, but that each of them would disappear a fraction of a second later. You might then then see in your living room these weird little streaks of motion and flashes that would be the signs of short-lived fireflies existing for an instant before disappearing. Scientists think that the vacuum of space is a little like that, except that the fireflies are subatomic virtual particles, so we can't see anything like the streaks and flashes.

Quantum field theory allows us to calculate how much energy there should be in the vacuum of space because of these virtual particles. The problem is that when scientists do the calculations, they get a number that is ridiculously wrong. According to this page of a UCLA astronomer, quantum field theory gives a prediction that every cubic centimeter of the vacuum should have an energy density of 10^{91} grams. This number is 10 followed by 90 zeroes. That is an amount trillions of times greater than the mass of the entire observable universe, which is estimated to be only about 10^{56} grams.

This means that according to quantum field theory every cubic centimeter of empty space should have more mass-energy than all the mass-energy in the entire observable universe.

How far off is this calculation? It varies on how you do the calculations. According to one type of calculation, the predictions of quantum field theory is wrong by a factor of 10^{60}, which is a factor of a trillion trillion trillion trillion trillion times. According to a different way of estimating it, the predictions of quantum field theory is wrong by a factor of 10^{120}, which is a factor of a million billion quadrillion quintillion sextillion septillion octillion times.

This prediction has been repeatedly referred to as the worst prediction in the history of physics. It could just as well be called the most wrong prediction in the history of human thought. No zealous apocalyptic doomer ever made a prediction more wrong, not even the preacher who predicted the end of the world would occur in 1843.

The matter is discussed in this well-written post by physicist Matt Strassler, which includes some nice graphics. Scientists don't talk about this matter very much, as it is something of a skeleton in their closet. But when they do discuss the matter, they refer to it as the vacuum catastrophe or the cosmological constant problem. Scientists think that the vacuum does have a very slight energy density (believed to be the main driver of what is called the cosmological constant, which is causing the universe's expansion to accelerate). But that energy density is less than .00000000000000000000000000000000001 percent of the amount predicted by quantum field theory.

Now it might be easy for us to just dismiss quantum mechanics, because of this ridiculously wrong prediction – we could just say, "This just shows that quantum mechanics is all wrong." But the problem is that quantum mechanics makes many other specific predictions that turn out to be exactly right. So scientists have to try struggle towards some guess as to how quantum mechanics could be right despite its very wrong prediction about the energy density of the vacuum.

One idea Strassler discusses is that the energy of the virtual particles related to bosons (one class of subatomic particles) is positive, and the energy of the virtual particles related to fermions (another class of subatomic particles) is negative. Could it be that these two somehow nearly cancel out each other, resulting in a vacuum with almost no energy density? But as Strassler points out, this doesn't work out, because there are "way too many fermions."

Another problem is that for you to have an exact balance of positive and negative contributions to the vacuum energy density would require fine-tuning of about 1 part in 10^{60}, which is 1 part in trillion trillion trillion trillion trillion times.

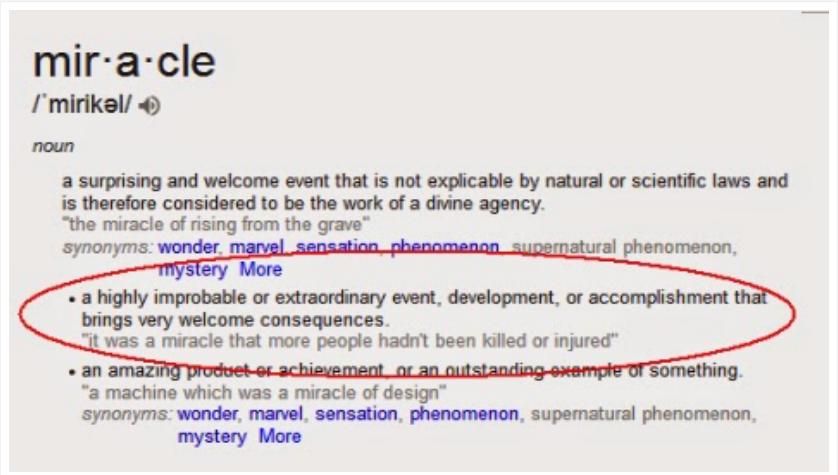
It could conceivably be that there are many additional undiscovered types of subatomic particles. It could also be that when one adds up the positive energy from all of the virtual particles corresponding to these particles, and subtracts from that the negative energy from all of the virtual particles corresponding to these particles, one ends up with a vacuum energy density of zero or almost zero. But that would require an incredibly improbable coincidence, one which randomly would have less than 1 chance in 1,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000. It would be like the chance of you adding up all the money earned on planet Earth, comparing it to all the money borrowed, spent or charged on credit cards, and finding that the two sums matched exactly, to the penny – but it would be far more improbable.

As Professor Strassler puts it:

To say this another way: even though it is possible that there is a special cancellation between the boson fields of nature and the fermion fields of nature, it appears that such a cancellation could only occur by accident, and in only a very tiny tiny tiny fraction of quantum field theories, or of quantum theories of any type (including string theory). Thus, only a tiny tiny tiny fraction of imaginable universes would even vaguely resemble our own (or at least, the part of our own that we can observe with our eyes and telescopes). In this sense, the cosmological constant is a problem of "naturalness" as particle physicists and their colleagues use the term: because it has so little dark energy in it compared to what we'd expect, the universe we live in appears to be highly non-generic, non-typical one.

If such a coincidence has occurred, then scientists are using the wrong term to discuss this problem. They use the term "the vacuum catastrophe," but the word catastrophe means something very bad. The fact that the vacuum is not even .000000000000000000000000000001 percent as large as predicted by quantum field theory, is however, something that is very good, because a very low vacuum energy density is necessary for our existence. If the vacuum energy density was even .000000000000000000000000000001 as large as predicted by quantum field theory, empty space everywhere would be far denser than steel, and intelligent life never could have appeared in the universe. There would be many reasons why suns could never have formed, and if they did exist, the super-dense vacuum would block all sunlight from ever reaching planets.

What is the proper term for an incredibly improbable but fortunate occurrence? The term is miracle. One definition of miracle is simply a very fortunate but very unlikely event, as in "the miracle of the jet landing on the Hudson River," or "the miracle that no one was killed by the bomb."



So rather than referring inappropriately to the "vacuum catastrophe," as scientists do, we should be talking about the

vacuum miracle by which a vacuum that is supposed to be super-dense turns out to be not dense at all.

Posted by Mark Mahin at 7:18 AM 1 comment:

Labels: cosmic fine tuning, cosmological constant, particle physics, physics, quantum mechanics, vacuum, vacuum catastrophe

Thursday, June 19, 2014

The Professor's Cosmic Confusions

There was an interview in the New York Times a few days ago with Tim Maudlin. The topic was the relation between religious ideas and modern cosmology. Since Maudlin is a professor of philosophy at New York University, and the author of a book on the philosophy of physics, readers might have expected some keen insights, but what they got instead was very shaky reasoning.

Maudlin spends the first part of the interview trying to suggest that cosmology has discredited religious thinking because it shows that the universe is very big, that man is not the center of the universe, and that the universe was not created specifically for the human species. Maudlin asserts, "Theism, as religious people typically hold it, does not merely state that some entity created the universe, but that the universe was created specifically with humans in mind as the most important part of creation." This is what is called a straw man argument, an attempt to discredit something by presenting some ridiculous caricature of it. Not many serious astronomically-literate thinkers of the past fifty years have maintained that our vast universe was created mainly for the sake of the human species, or that man is the most important species in the universe. Theism may simply be defined as the belief that some higher power created the universe. The outdated belief that man is the most important part of the universe is an entirely separate belief that is not at all a consequence of theism. Discrediting that outdated belief does absolutely nothing to discredit theism.

The interviewer then mentions that some have argued that the universe's fundamental constants seem to be fine-tuned (as discussed here), and that may suggest that the universe was designed by some intelligence interested in having intelligent creatures exist. Here is Maudlin's reply:

Our physical theories contain quite a large number of "constants of nature," of which we have no deeper account. There seem to be more of them than most physicists are comfortable with, and we don't know for sure whether these "constants" are really constant rather than variable. This gives rise to questions about "fine-tuning" of these constants. One thing to keep in mind is that the true number and status of the "constants of nature" is not part of any well-established physical theory: It is part of what we don't yet know rather than what we do know...Since we don't even know if the "constants" are constant, we certainly don't know enough to draw any conclusions about the best account of why they have the particular values they have right now and around here. Since we don't know how the various "constants" might be related to each other by deeper physics, the game of trying to figure out the effect of changing just one and leaving the rest alone also is not well founded.

These statements are a combination of misinformed falsehoods and irrelevancies. Very far from being "part of what we don't yet know rather than what we do know," the fundamental constants are some of the more well-understood aspects of nature. We pretty much know everything about

them except why they have the numerical values that they have. We know the fundamental constants of nature (things such as the gravitational constant, the proton charge, the proton mass, and the speed of light) so well that we have measured their values to six decimal places or more, as shown in the table below. Maudlin's claim that the constants of nature are "not part of any well-established physical theory" is hilarious. The constants of nature are, in fact, fundamental parts of the most well-established theories in modern science: Einstein's theory of special relativity, Einstein's theory of general relativity, quantum mechanics, and the Standard Model of Physics. We also know with a very high likelihood that the constants of nature have varied by almost no amount over the course of billions of years. Studies of quasars and isotopes typically produce a result such as a variation of less than 1 part in 100,000 over a billion years. Whether they vary by a very tiny amount over billions of years is irrelevant to discussions of whether such fine-tuned constants support the idea that the universe was purposefully created.

"Trying to figure out the effect of changing just one [constant] and leaving the rest alone" is not a game, but a perfectly serious scientific task which quite a few scientists have engaged in over the past five decades, publishing their results in scientific papers (100 examples can be found here). Far from being "not well founded," such results are numerically rigorous and as well-founded as any other scientific results. In short, almost everything Maudlin says on this topic is off-base.

Speed of light	299 792 458 $m \cdot s^{-1}$
Planck's Constant	6.626 069 57(29) × 10^{-34} J·s
Proton Mass	1.672 621 777(74) × 10^{-27} kg
Electron Mass	9.109 382 91(40) × 10^{-31} kg
Neutron Mass	1.674 928 × 10^{-27} kg
Gravitational Constant	6.67384(80)×10^{-11} $m^3 \cdot kg^{-1} \cdot s^{-2}$
Proton Charge	1.602 176 565(35) × 10^{-19} C
Electron Charge	-1.602 176 565(35) × 10^{-19} C
Fermi Coupling Constant	1.166 364(5) × 10^{-5} GeV^{-2}
Coulomb's Constant	8.987 551 787... × 10^9 $N \cdot m^2 \cdot C^{-2}$

Fundamental physical constants

Maudlin also reasons as follows:

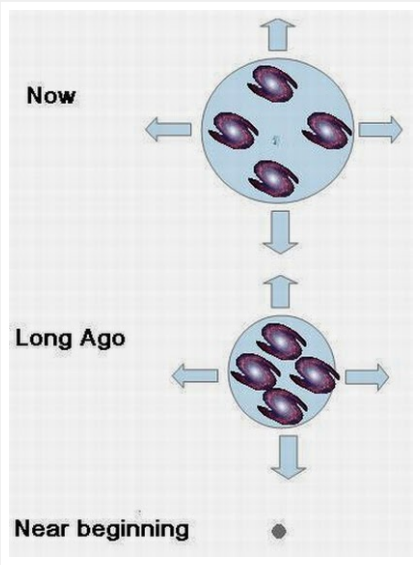
One thing is for sure: If there were some deity who desired that we know of its existence, there would be simple, clear ways to convey that information. I would say that any theistic argument that starts with the constants of nature cannot end with a deity who is interested in us knowing of its existence.

This argument is irrelevant because whether a creator wants us to know of his existence is a separate issue from whether such a creator exists. It is entirely possible that there exists a creator who is not particularly interested in whether tiny small-brained bit-player creatures such as us are certain of that creator's existence at this point in our development. A theist could also argue that the creator has left signs of his work in nature (the Big Bang, the exact equality of the proton charge and electron charge, the extreme fine-tuning of the cosmological constant, the improbable smoothness of the universe, and so forth), and that the gradual unveiling of such signs over decades (with the help of science) is ultimately more uplifting than some one-shot affair of seeing something like a "God exists" sign in the sky.

Perhaps realizing that he has failed to shoot down the idea that the universe's fine-tuning may suggest a cosmic creator, Maudlin then resorts to the favorite last resort of the champions of blind chance: a theory of an infinity (or near-infinity) of other universes. When all else fails, pull a

multiverse out of your hat. Maudlin concedes that “this idea is highly speculative, and there is no direct evidence in its favor. “ One might also add that postulating an infinity of universes fails from the standpoint of Occam's Razor (“entities should not be multiplied beyond necessity”), because it leads you to the most complicated explanation possible rather than the simplest explanation. Moreover, a multiverse fails as an explanation because it postulates a situation in which there may be a likelihood of *some* universe being habitable, but does not change the odds of *our* universe being habitable, which are exactly the same regardless of whether a multiverse exists. There is also the fact that while we know many things are due to coincidence and we know that many things are due to design, in the history of explanation there is not one verified case of anything being successfully explained by assuming a multiverse; so in that sense a multiverse explanation is not on solid intellectual ground. We may also wonder: if Maudlin doesn't think the fine-tuning of physical constants is such a big deal (as he suggests), then why he is going to the extreme of suggesting a vast number of universes to try to explain it?

Discussing whether the Big Bang (the sudden origin of the universe about 13 billion years ago) may support the idea that the universe had a creator, Maudlin says, “I think we don’t know enough to make any plausible guess about even whether there was an initial state, much less what it might have been. This goes beyond what we have good evidence or theory for.” Most cosmologists would disagree with that statement. Such scientists say that we do have good evidence that the universe suddenly began about 13 billion years ago in the event called the Big Bang. The evidence includes the cosmic background radiation and the expansion of the universe (“rewinding the tape” on a universe in which galaxies are all flying farther and farther apart from each other leads inevitably to a point of sudden origin in a state of incredible density).



Schematic diagram of Big Bang and expanding universe

There is abundant evidence that something like the Big Bang was the beginning of our universe, which is why Penzias and Wilson won the Nobel Prize. There may be some small degree of uncertainty in regard to this beginning, a little wiggle room for doubt, but it is not accurate to claim as Maudlin does that “we don’t know enough to make any plausible guess about even whether there was an initial state.” We do have enough not just to make a plausible guess, but to make a high-probability conclusion: the evidence very clearly indicates us that there very probably was a sudden beginning 13 billion years ago. It also indicates that the initial physical state of the universe had "an enormous amount of fine-tuning," in the words of a recent scientific paper on the topic, discussed here.

Maudlin also states, “As yet, there is no direct experimental evidence of a

deity, and in order for the postulation of a deity to play an explanatory role there would have to be a lot of detail about how it would act." But, in fact, modern scientists do grant an explanatory role for things for which there is no direct experimental evidence, even when they don't have any details about such things or how they act. Two such things are dark matter and dark energy, both of which are completely mysterious, not understood in any detail, and not things that have been confirmed by any experiment. Scientists are willing to adopt completely vague ideas of the likely existence of dark matter and dark energy, without any details, because they find postulating such things useful in explaining certain hard-to-explain characteristics of our universe. So by requiring a "lot of detail" about an explanatory factor before making an explanatory assumption, Maudlin is setting up some artificially high hurdle for the hypothesis of a divine creator, one that scientific assumptions are not required to meet.

Postscript: A huge team of scientists (the Planck satellite team) has just released a paper finding that two of the fundamental constants of nature (the fine structure constant and the electron mass) have changed by less than 1 percent since the beginning of the universe.

Posted by Mark Mahin at 2:00 PM No comments:

Labels: Big Bang, cosmic fine tuning, cosmology, fundamental constants, philosophy, theism

Sunday, June 15, 2014

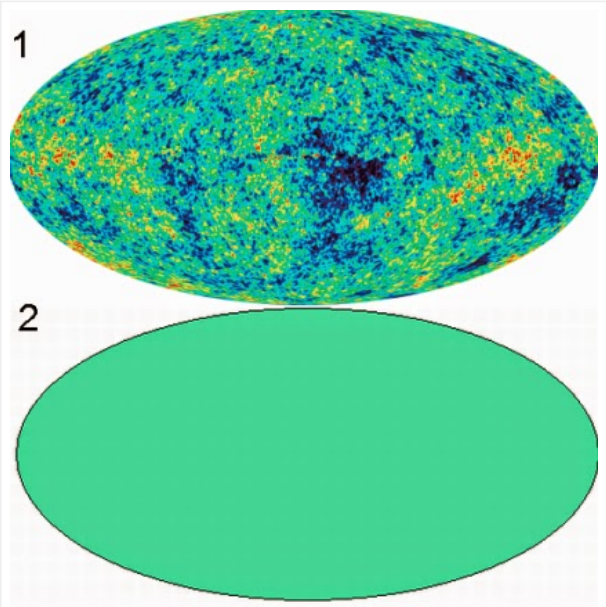
Early Universe Had "Enormous Amount of Fine-Tuning," Says New Scientific Paper

Cal Tech physicist Sean Carroll just released a scientific paper entitled *In What Sense Is the Early Universe Fine-Tuned?* Since Carroll has taken on a part-time role as a worldview warrior, trying to throw cold water on anyone suspecting that the universe is not the result of pure blind chance, I suspect that some with similar views must have started to read the paper hopefully, thinking to themselves: now finally here is someone who will debunk all that talk about the early universe being extremely fine-tuned.

Fine-tuning basically means "fitness for an end," and the term is used by both scientists and philosophers nowadays in a religiously neutral sense. Using the term fine-tuning does not semantically imply belief in a fine-tuner (although if one is discussing a sufficiently improbable case of fine-tuning that might, arguably, bring to mind the notion that such a fine-tuner once existed). When people talk about fine-tuning of the early universe, they mean the idea that the early universe had some arrangement of matter and energy (or evolutionary trajectory) that was highly improbable, something that was conducive to the eventual appearance of creatures such as us. Discussions of the fine-tuning of the early universe are discussions of the way the universe was about 13 billion years ago, around the time of the Big Bang, when the universe was very, very hot and dense. Cosmic fine-tuning is also discussed in a different context, the observation that the universe's fundamental constants and laws are improbably suitable for the existence of intelligent life. That's a fascinating topic discussed here, but in this post I will discuss only the first type of fine-tuning.

Rather than thinking of fine-tuning in the early universe in terms of a horizon problem or a flatness problem, Carroll suggests that it should be considered in terms of smoothness and trajectories. We know that the early universe was incredibly smooth. About 380,000 years after the Big Bang, the universe was uniform to 1 part in 100,000. We know that from the cosmic background radiation, which has no lumps greater than 1 part in 100,000. You may get the wrong idea by looking at one of those maps of the cosmic background radiation that show different colors. Those maps are amplifying differences of only 1 part in 100,000.

A map of the cosmic background radiation that does not use such an amplification would consist of a single color (see the visual below).



1. Map of cosmic background radiation, with "lumps" exaggerated to show variations of 1 part in 100,000
2. True map of cosmic background radiation, without such exaggerations

But such almost perfect smoothness, Carroll points out, would not occur in more than the tiniest fraction of the trajectories that the universe might have had after an event such as the Big Bang. How small is that fraction? On page 21 of the paper Carroll estimates that "the total fraction of the trajectories that are smooth at early times" is very roughly 1 in 10 *to the 66 millionth power*. That's a fraction equal to 1 in *x*, where *x* is 10 followed by 66 million zeroes.

How low is this probability of 1 in 10 to the 66 millionth power? It's a probability much less than the probability of you filling up a huge dump truck with many thousands of dice, having the truck dump the dice gradually along a road, and then finding that each and every one of the dice landed on the road coming up showing the number 6 (with no 1's, 2's, 3's, 4's, or 5's showing anywhere on the road). It's also a probability much less than the probability of you guessing the birth date (month, day, and year) of every person you ever met, and you guessing the correct birth date each and every time throughout your life.

Carroll says of his estimate, "This represents a very conservative estimate for the amount of fine-tuning involved in the standard cosmological model."

Does the theory of cosmic inflation eliminate this fine-tuning? Carroll says:

Inflation, therefore, cannot solve this problem all by itself. Indeed, the measure reinforces the argument made by Penrose, that the initial conditions necessary for getting inflation to start are extremely fine-tuned, more so than those of the conventional Big Bang model it was meant to help fix.

Carroll refers to the famous cosmologist Sir Roger Penrose, who made an argument (based on entropy) that the early universe required fine-tuning even more improbable than the microscopic probability listed by Carroll.

Carroll also concludes (page 21):

We can therefore conclude that the smoothness of the early universe does indeed represent an enormous amount of fine-tuning... The real sense in which the early universe was fine-tuned is extremely simple: the overwhelming majority of cosmological trajectories, as quantified by the canonical measure, are highly nonuniform at early times, and we don't think the real universe was like that. Clearly, the specific numerical value we obtain is not of central importance; what

is certain is that the history of our actual universe does not look anything like it was chosen randomly.

I can give a very crude analogy of how mind-boggling this is, one involving a trajectory and smoothness. Imagine you are walking along carrying a white poster board. You walk by a big muddy hole in the street. A big truck speeds by, driving over the muddy hole. Splat! A big blob of mud hits your poster board. Later you analyze the mud splat, and find that the distribution of mud is uniform to one part in 100,000. It's as if someone very carefully sprayed on the mud with a spray can, but even more orderly. How the hell could that have happened?

The fact that this result (1 chance in 10 to the 66 millionth power) has been advanced by Sean Carroll may make it all the more compelling, as Sean Carroll (a champion of naturalism) is the type of thinker one might expect to be hostile towards any conclusion of cosmic fine-tuning. Professor Carroll's naturalism forbids him from philosophically connecting the dots in regard to this and other cases of cosmic fine-tuning, but it is not obvious that others should conform to such a prohibition.

Posted by Mark Mahin at 9:25 AM No comments:

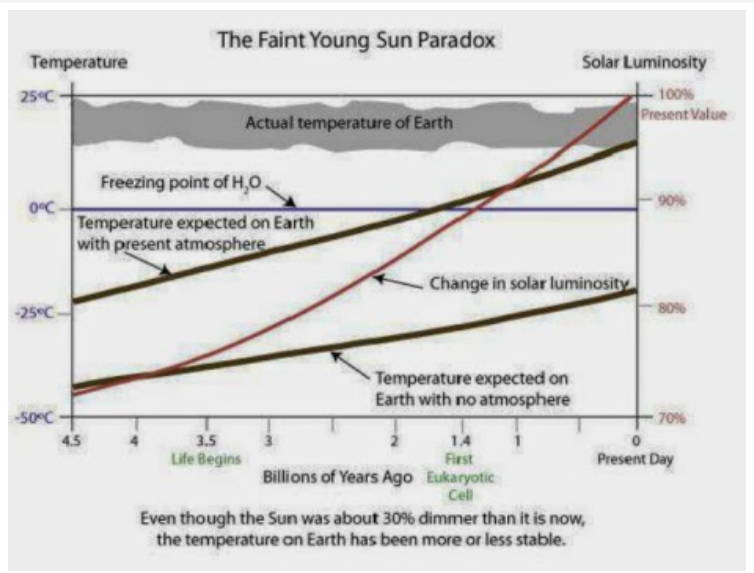
Labels: anthropic principle, Big Bang, cosmic background radiation, cosmic fine tuning, cosmic inflation, cosmology, early Universe

Sunday, June 1, 2014

The Faint Young Sun Paradox: An Unsolved Mystery

The origin of life seems to require liquid water. Geological evidence indicates that our planet was warm enough for liquid water to have existed about 3.5 billion years ago, when the first earthly life appeared. But models of solar evolution lead scientists to conclude that the sun gave off much less heat billions of years ago. Judging only from the sun's evolution, our planet should have been completely frozen three billion years ago. This discrepancy is known as the faint young sun paradox.

Below is a diagram from a scientific paper by Shani and Shtanov discussing the faint young sun paradox. As you can see from the diagram, if we assume (for the sake of simplicity) that our planet has had its current atmosphere for the past 3 billion years, then our entire planet should have been frozen until about 1.7 billion years ago.



Scientists have advanced some explanations for the faint young sun paradox, but none of them is problem-free. One explanation is that billions of years ago our planet's atmosphere was vastly different. It could have been that billions of years ago our

atmosphere had vastly more carbon dioxide and methane. That would have produced a greenhouse effect many times greater than the greenhouse effect currently produced by man-made pollutants.

But there are some problems with this theory. There would have needed to be almost ridiculous amounts of carbon dioxide and methane in the atmosphere for the greenhouse effect to have been sufficient to explain the paradox. For example, in this link there's a discussion of some scientists hinting that they have solved the faint young sun paradox through a greenhouse gas explanation. But they imagine carbon dioxide levels of 20,000 parts per million – fifty times greater than today's level. Why are such high levels of greenhouse gases implausible? A good explanation is given by this scientific paper by Shani and Shtanov:

While CO_2 [carbon dioxide] can be removed from the atmosphere by bacteria and plants during photosynthesis and also by the weathering of rock, the enormous concentrations referred to earlier seem difficult to account for. Indeed, large amounts of CO_2 in the early atmosphere would have led to the formation of the iron carbonate based compound siderite ($FeCO_3$). However, analysis of billion year old paleosols challenges this picture by finding no $FeCO_3$. Found instead are iron silicates which support a much more moderate presence of CO_2 in the early atmosphere. Moreover, it would be difficult to make CO_2 disappear almost entirely from the Earth's atmosphere since much of it, after reacting with rocks and being used by shell-forming organisms to form $CaCO_3$ shells, gets deposited on the ocean floor and makes its way back into the atmosphere via volcanic activity and plate tectonics . The presence of other greenhouse gases is equally problematic.

The paper makes the point that if you had once had fantastically high levels of carbon dioxide (CO_2) in the atmosphere, and that had slowly disappeared, much of that carbon dioxide would have been stored in what are called carbon dioxide "sinks." But over the eons the carbon dioxide in those sinks would have been slowly re-released by geological processes – which would have left us with more carbon dioxide in the atmosphere than we have today.

What solution do Shani and Shtanov suggest for the faint young sun paradox? They suggest a varying gravitational constant. The gravitational constant is the fundamental constant that indicates the strength of gravitation throughout the universe. It is one of several fundamental constants that are crucially important in determining the behavior of the sun. The authors suggest that if the gravitational constant had varied by 2 percent over the past few billion years, that could explain the faint young sun paradox.

This explanation can be called something of a "Hail Mary pass." Scientists don't quite have a rule of "if all else fails, suggest the laws of nature have changed," but assumptions about changing laws of nature or changing physical constants are generally regarded as a kind of last resort. This paper by Pitjeva and Pitjev claims to set a limit on changes in the gravitational constant. The paper (based on spacecraft observations) concludes that the gravitational constant changes by less than 1 part in 20,000,000,000,000 per year. This conclusion is hugely inconsistent with the hypothesis of Shani and Shtanov that the faint sun paradox can be explained by assuming a 2 percent variation of the gravitational constant. If Pitjeva and Pitjev are correct, the gravitational constant could not have varied by more than 1 part in 10000 during the past five billion years, a limit which rules out a 2 parts in 100 (2 percent) variation as imagined by Shani and Shtanov.

That apparently shoots down a varying gravitational constant as an explanation for the faint young sun paradox. But what about other fundamental physical constants that the sun's behavior depends on, such as the fine-structure constant? That's not an area scientists prefer to be fiddling with, for two reasons. First, it has already been concluded that the sun is extremely sensitive to changes in the fine-structure constant, and that if it were only the tiniest bit different, the sun would be some other type of star such as a red dwarf or a blue giant. For example, this paper by a physicist finds that changing the fine-structure constant by 2 parts in 1000 would cause the earth to freeze, and changing the fine-structure constant the other way by only a few percent would cause the earth's water to boil. Given this extreme fine-tuning of the fine-structure constant, do we really want

to imagine some other fine-tuning, some just-right slow change in the fine structure constant to resolve the faint young sun paradox? Also, a study based on earthly isotopes indicates that the fine-structure constant is totally invariant over the eons, varying by less than 1 part in 10,000,000,000,000,000 per year.

So where does that leave us in regard to the faint young sun paradox? We are left with an unsolved mystery. Somehow our planet was warm billions of years ago, but we really don't know why it wasn't completely frozen. Considering the matter, we should be humbled, and remember how fragmentary and incomplete our knowledge of nature is.

Posted by Mark Mahin at 12:10 PM No comments:

Labels: cosmic fine tuning, cosmic mysteries, faint young sun paradox, origin of life

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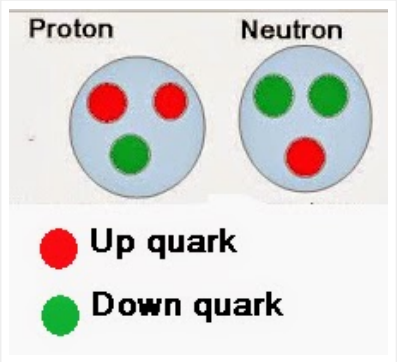
Saturday, May 17, 2014

One Insanely Eerie Thing About the Neutron

I had quite a few readers for my previous blog post *4 Insanely Eerie Things About the Electron*. Now let me discuss another of the basic subatomic particles: the neutron. Having no involvement with electricity, neutrons have a reputation as being rather boring particles. I will not be able to list four incredibly strange aspects of the neutron. And I may not be able to list anything as insanely eerie as this report from yesterday's NY Daily News. But there is one incredibly strange and improbable thing about the neutron which no scientist has been able to explain in a way that removes astonishment. This is simply the fact that neutrons are electrically neutral, having no net electrical charge at all. Let me explain why this is much, much less likely than you winning 100 million dollars in the Powerball lottery tomorrow.

If a neutron were not composed of any smaller charged particles, then there would be nothing particularly improbable about the fact that neutrons are electrically neutral. But according to the Standard Model of Physics, the neutron is composed of three smaller charged particles. The Standard Model says that a neutron is composed of one Up quark and two Down quarks.



According to the Standard Model of Physics, the Up quark has a positive electric charge equal to two thirds of the charge of a proton. The Down quark has a negative electric charge equal to one third the charge of the proton. The amount of positive charge in the neutron therefore exactly balances the amount of negative charge in the neutron, leaving the neutron with a net electric charge of 0.

I can illustrate this balance by the following visual. The scale shows the positive charge of the neutron on the left, and the negative charge of the neutron on the right. The two balance each other precisely (as represented by the balanced scale).

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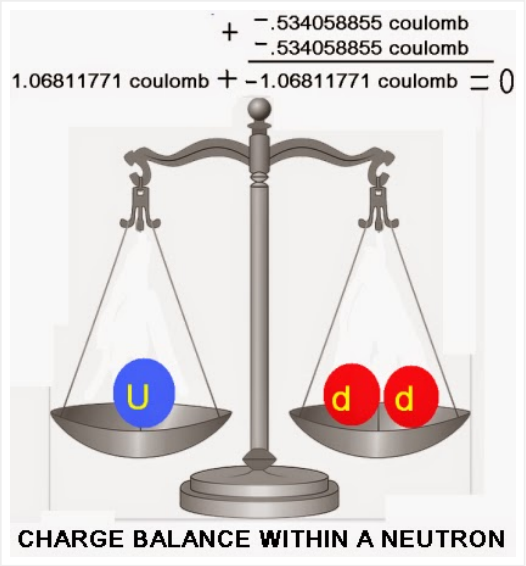

How precise is this balance? In the above visual I only use 9 decimal places to avoid making the numbers too small to read. But the actual balance is to at least twenty decimal places. The exact figure given in this scientific paper is that the neutron charges is less than 1.8 X 10^{-21} of an electron charge. For this to be true, the positive charge within a neutron must differ from the negative charge within the neutron by less than than 1 part in 100,000,000,000,000,000,000.

It would seem that the chance of this coincidentally happening is incredibly low. To give an analogy, imagine you make a great deal of money as a Wall Street investment banker, and your spouse is always losing money at the casino. At the end of the year, you calculate your net income, and find that even though you've made millions this year, when you subtract your spouse's gambling losses, you find that you net income is exactly 0 dollars and 0 cents, because your spouse's gambling losses coincidentally exactly canceled out your income, to the penny.

But isn't there some way to avoid believing that we have been blessed by a coincidence in this matter, a coincidence with a probability of less than 1 in 100,000,000,000,000,000,000? We might avoid the coincidence if we could say that an Up quark is made up of exactly two Down quarks – except that wouldn't really work, because the charge of the Down quark is negative and the charge of the Up quark is positive. Also, scientists do not actually think that an Up quark is made up of two Down quarks.

We might also avoid the coincidence if we had some good basis in believing in a required quantization of electric charge – a reason why electric charge must necessarily occur in a multiple of one third of the proton charge or one third of the electron charge. But no such reason is known. In fact, the scientific paper I just cited says at its beginning, "The Standard Model with three generations does not have electric charge quantization."

One may ask whether this coincidence is the same coincidence as the fact that the proton charge exactly equals the electron charge (the only difference being that the proton charge is positive and the electron charge is negative). No, that is a separate coincidence, but one equally improbable, also requiring something with a chance smaller than 1 in 1,000,000,000,000,000,000.

The Standard Model gives us three stable charged particles: the Up quark with a charge of 2/3*e*, the Down quark with a charge of -1/3*e*, and the electron with a charge of -1*e* (where *e* is the proton charge of 1.60217657 coulomb). Protons are made of 2 Up quarks and one Down quark, and neutrons are made of 2 Down quarks and one Up quark. We have two separate coincidences here: (1) the fact that the charge of the Up quark is precisely twice the charge of the Down quark (not considering the sign), and (2) the fact that 2 Up quarks and a Down quark (the constituents of a proton) have a total charge that adds up to a number exactly equal to the charge of the electron (not considering the sign). Experiments have verified that the proton charge and the electron charge differ by

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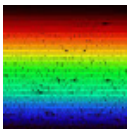
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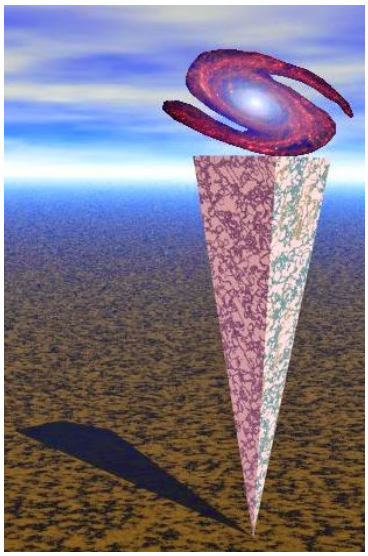
less than 1 part in 1,000,000,000,000,000,000 (not considering the signs).

The second coincidence is perhaps more astonishing, given the fact that the rest mass of the proton is 1836 times larger than the rest mass of the electron, but I won't dwell on this fact given that this post is about the neutron.

Both of these coincidences are necessary for our existence, as are numerous other coincidences discussed here. Is there some simple way to visualize this strange situation, in which a habitable universe depends on an exquisite balance within nature? Perhaps the following visual will do. The spiral galaxy symbolizes our habitable universe. The upside-down pyramid symbolizes the degree of balance required for that habitability.



The exquisite balance

Posted by Mark Mahin at 9:32 AM No comments:

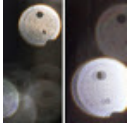
Labels: anthropic principle, coincidences, cosmic fine tuning, neutron, particle physics

Sunday, April 20, 2014

Black Widow Pulsar Gives Fatal Bite to Theory of Cosmological Natural Selection

Faced with the fine-tuning problem of why the universe seems to be so well calibrated to allow the existence of intelligent life, some thinkers have advanced the idea of a multiverse, the idea that there is a vast ensemble of universes. The thinking is that if there are an infinite or nearly infinite number of universes, then we might expect one of them to luckily have just the right conditions allowing for observers. The drawbacks of this approach are many: the nearly infinite baggage of assuming all of those universes, almost all uninhabited; the violation of the principle of Occam's Razor asserting that "entities should not be multiplied beyond necessity" when trying to explain something; the violation of the principle of mediocrity asserting that a random sample from a larger population should be assumed to be representative of the population; the fact that we have never had a verified case of anything being successfully explained by a multiverse; the fact that while the probability of *some* universe being habitable by chance may be improved by assuming other universes, the probability of any particular universe (including *our* universe) being habitable by chance is not at all improved by such an assumption, not even by even 1 percent.

Perhaps sensing the weakness of a simple multiverse theory, some theorists have advanced a more complicated theory – a theory they call cosmological natural selection. The idea seems to have first been advanced by the physicist Lee Smolin (author of the excellent book *The Trouble With Physics*). In his book *Time Reborn*, Smolin describes the theory as follows:



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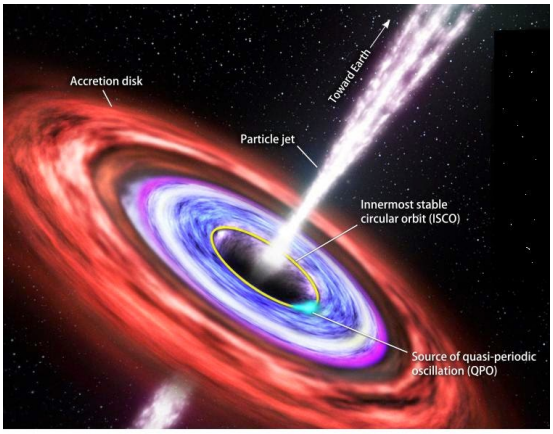
The basic hypothesis of cosmological natural selection is that universes reproduce by the creation of new universes inside black holes. Our universe is thus a descendant of another universe, born in one of its black holes, and every black hole in our universe is the seed of a new universe. This is a scenario within which we can apply the principles of natural selection.

Smolin claims to have a theory of how the physics of the universe could evolve through natural selection. But how on earth can we get anything like natural selection out of the idea of new universes being created by the formation of black holes? Smolin gives the following strained reasoning: (1) he claims that the physics that favors a habitable universe are similar to the physics that favor the production of black holes; (2) he claims that a new universe produced by a black hole might have slightly different physics from its parent universe; (3) he claims that random variations in physics that would tend to produce universes that produce more black holes would cause such universes to produce more offspring (more universes); (4) he claims that as a result of this "increased reproduction rate" of some types of universes, we therefore would gradually see the evolution of physical laws and constants that tend to favor the appearance of life and also the production of black holes.



Artist's depiction of black hole (Credit: NASA Goddard Space Flight Center)

But there are many holes in this theory based on black holes.

First, let's look at the linchpin claim that a new universe can be produced from the collapse of a huge star to form a black hole. Some analysts let Smolin get away with making this claim, but there is no reason why that should be done. The idea that a new universe can be produced from the collapse of a black hole is a complete fantasy, with no basis in fact. We have no observations to support such a theory.

But let's try to open the door to such an idea. What would it be like if the matter in a collapsing star formed a black hole, and that extreme density of matter caused the surrounding space to be pinched off into its own little bubble? What would we then have? Such a little bubble should not be called a new universe, as that gives a completely misleading idea of some vast area with enough matter to form many galaxies. The bubble would be properly referred to as a spacetime bubble, or a micro-universe.

If such a spacetime bubble were to be formed, what would happen to the matter that was trapped in the black hole? It would be separated from our universe permanently, sealed off in its own little realm. We would no longer observe the gravitational effects of that matter in our universe. We would observe that black holes do not exert gravitational effects once they form. But that is not at all what we observe in regard to black holes. Black holes continue to exert very strong gravitational effects (such as sucking up all nearby gas), just as if their matter continued to exist in our universe. In short, our observations are in conflict with the idea that when a massive star collapses to become a black hole, that matter exits our universe to form another universe. Our observations indicate that the matter lost in black holes is still here in our universe.

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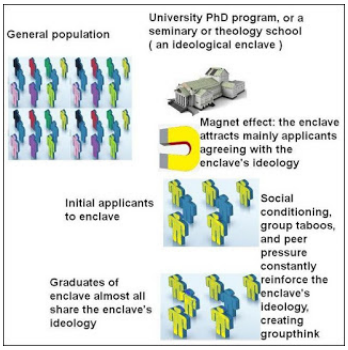
When newly awarded PhD's start writing papers and books and judging truth, they are rather like jurors who have been methodically expos...



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Labels

- 3D printing (1)
- abundance (1)
- acupuncture (1)

And what if the matter in a collapsing star were to cause a new universe when a black hole formed, and the matter moved over to that universe? You would then have a tiny little one-star-sized universe. Such a possibility is worthless in explaining our universe, which has the mass of at least 1,000,000,000,000,000,000 stars.

Another problem with Smolin's theory is that it absolutely requires you to believe that our universe has been optimized to produce a maximum number of black holes -- a thesis that is rather implausible given the fact that the nearest black hole is no closer than 1500 light years away, and that only one in about 30,000,000 nearby stars is a black hole. In fact, other scientists maintain that the universe is not at all optimized to produce black holes.

Another huge problem with Smolin's idea is that it does not explain how any universe could have originally came to exist in the state in which black holes could exist in it (a state similar to a state in which life could exist in it), a state enormously improbable to occur by chance. Although you may associate the concept of black holes with ideas of chaos, randomness, or disorder, there are actually many requirements that any universe must meet in order for it to have stars that can form into black holes. Smolin lists 6 such requirements on page 36 of this paper, all of which are incredibly lucky long shots. Another requirement is that the proton charge very precisely match the electron charge to many decimal places, for unless you have that coincidence there will never exist the stars from which black holes form.

In our universe the proton charge and the electron charge match to at least eighteen decimal places, and there is every reason to think that this fine balance is necessary for stars to exist. Imagine if the proton charge and the electron charge differed by one part in a trillion. That would be like increasing the electromagnetic forces on a star by one part in a trillion. But the electromagnetic force (one of the four fundamental forces) is about a trillion trillion trillion times greater than the gravitational force (another of the four fundamental forces), which means that even if there were a very tiny difference in the proton charge and the electron charge (say, 1 part in a trillion), the resulting repulsive force would be many, many times greater than the force of gravity holding together stars, and stars could not hold together. Greenstein (a professor emeritus at Amherst) says that the proton charge and the electron charge have to be balanced to 18 decimal places for stars to exist.

So let's imagine a collection or series of universes with random properties. It would require an incredibly unlikely set of conditions for any particular one of these universes to have the conditions necessary to produce black holes – a long shot with odds of no greater than 1 in a billion billion. According to Smolin's theory, once such a universe existed it might begin making copies of itself, as black holes formed new universes. So if you started out with several billion billion universes, a few might produce black holes, and then gradually (according to Smolin's theory), the fraction of the universes that had black holes (and that were compatible with life) might keep getting higher and higher over the eons. Such a theory might comfort some people by making our universe seem not so untypical in a collection of universes. But it would do nothing to explain the original incredibly unlikely long shot.

To give an analogy, imagine you have a book-copying robot which is given a copy of a rare and wonderful book, such as a first edition of Dickens. Such a robot might then make 1000 copies of the book, and stack them on your bookshelf. Seeing all of those copies on your bookshelf, you might then tend to think that the original first edition was not so rare and wonderful, but this machine would not at all explain the origin of the first edition in the first place, something that would be very hard to plausibly explain by any theory of luck.

Smolin claims that one advantage of his theory is that it makes a falsifiable prediction, and in a 2004 paper (page 38) he lists one such prediction:

There is at least one example of a falsifiable theory satisfying these conditions, which is cosmological natural selection. Among the properties W that make the theory

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

falsifiable is that the upper mass limit of neutron stars is less than 1.6 solar masses. This and other predictions of CNS have yet to be falsified, but they could easily be by observations in progress.

But in this 2010 Science Daily piece reported the discovery of a neutron star: "The researchers expected the neutron star to have roughly one and a half times the mass of the Sun. Instead, their observations revealed it to be twice as massive as the Sun."

So according to Smolin's own guideline, the theory of cosmological natural selection has been falsified. He said it would be falsified if we discovered any neutron stars greater than 1.6 solar masses, and a neutron star with a mass of 2.0 solar masses has been discovered.

In fact, this paper estimates that a particular neutron star called the black widow pulsar has 2.4 solar masses. In his book *Time Reborn*, Smolin concedes, "If that finding holds up under more precise measurements, cosmological natural selection will be falsified."

It would seem that the black widow pulsar has delivered a fatal bite to the theory of cosmological natural selection, somewhat like a black widow spider giving a fatal bite to a human.

Posted by Mark Mahin at 11:53 AM No comments:

Labels: Black Holes, cosmic fine tuning, cosmological natural selection, cosmology, multiverse, theories of the universe

Monday, March 24, 2014

The Impossibility of Verifying a Varying-Constants Multiverse

For several decades scientists have discovered more and more examples suggesting our universe is seemingly tailor-made for life. A list of many examples is discussed here. One dramatic example is the fact that even though each proton in our universe has a mass 1836 times greater than the mass of each electron, the electric charge of each proton matches the electric charge of each electron exactly, to 18 decimal places, as discussed here (the only difference being that one is positive, the other negative). Were it not for this amazing coincidence, our very planet would not hold together. But scientists have no explanation for this coincidence, which seems to require luck with a probability of less than 1 in 1.000,000,000,000,000,000. As wikipedia states, "The fact that the electric charges of electrons and protons seem to cancel each other exactly to extreme precision is essential for the existence of the macroscopic world as we know it, but this important property of elementary particles is not explained in the Standard Model of particle physics."

Wishing to cleanse their minds of any suspicions that our universe may not be the purely accidental thing they imagine it to be, quite a few materialists have adopted the theory of a multiverse. This is the idea that there is a vast collection of universes, each very different from the other. The reasoning is that if there were to be, say, an infinite number of universes, then we would expect that at least one of them would have the properties necessary for intelligent life, no matter how improbable it may be that such properties would exist.

I will refer to such a collection of universes as a varying-constants multiverse, since the concept is that the fundamental constants of different universes in this collection would vary. The fundamental constants are items such as Planck's constant, the gravitational constant, the speed of light, the proton charge, the electron charge, and the mass ratio of the proton and the electron.

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

The question I will consider in this post is: is there any possible way that such an idea of a varying-constants multiverse could be verified?

Why a Varying-Constants Multiverse Could Not be Verified Through Telescopic Observations

You might think that we could verify the idea of a varying-constants multiverse by long-range telescopic observations. You can imagine scientists building some giant telescopes a thousand times more powerful than any ever built. If such telescopes were to allow scientists to look a thousand times farther than they ever looked before, then you might guess that one day scientists might be able to see other regions of space where the constants of nature differ. You might, for example, imagine that scientists looking as far as possible in one direction might see some distant area where the speed of light was much higher, and scientists looking as far as possible in some other direction might see some distant area where the gravitational constant was much different than it is on Earth.

But nothing of the sort has happened, and there is a reason why it cannot ever happen. The reason is that because of the limit set by the speed of light, whenever we look very far away in space, we are looking back in time. So when we look 10 billion light-years away (near the current observational limits of our telescopes), we are looking 10 billion years back in time. Scientists say that our universe began in the Big Bang about 13 billion years ago. So we have a built-in limit as to how far our telescopes will ever be able to look. We can never hope to observe anything, say, 16 billion light years away, simply by building more and more powerful telescopes.

Our most powerful telescopes (such as the Hubble Space Telescope) can look almost as far as humans will ever be able to see with telescopes, which is about 13 billion light years. There is no chance at all that by looking a little farther we will be able to see some sign of another universe. As we approach the observational limit of about 13 billion years, we are looking back a little more to the beginning of our own universe. Scientists say that various aspects of the very early universe and the Big Bang (such as what is called the recombination era) act as a barrier that will forever block us from observing all the way back to the time of the universe's birth in the Big Bang.

So there is no hope at all of being able to verify any theory of a varying-constants universe just by looking farther and farther out in space. But some have suggested two other ways in which we might be able to lend credence to a multiverse theory by telescopic observations: (1) by observing strange, unexplained motions of parts of our universe; (2) by finding evidence of previous cycles of our universe.

The first of these involves the idea that we might be able to see that some fraction of our universe is moving around in an unexplained way, possibly because of gravitational influences by some nearby universe. Such an observation is theoretically possible, but would not actually be any observational support for the idea of a multiverse with varying constants. If we observed such an unexplained motion, it would best be explained by postulating new factors and physics within our observed universe. Even if we were to be forced to conclude that our universe is being gravitationally tugged by some other universe, that would at best be support for the idea that our universe has a "sister universe," rather than the almost infinitely more complicated idea that there are a vast collection of universes. Moreover, such an observation would provide no support for any idea that other universes have a variety of different physical constants.

The same thing can be said about the idea of finding evidence that our universe had previous cycles. If such evidence were found, it might lead us to think that the universe existed before the Big Bang, and that the universe is older than 13 billion years. But such evidence would not give any basis for believing in anything like a varying-constants multiverse. If our universe had previous cycles, there is no reason to think that its fundamental constants such as the proton charge would change from one cycle to the next. Science knows of no mechanism by which the fundamental constants of the universe could change (here I exclude the Hubble constant, a measure of the universe's expansion rate, which is not really a fundamental constant).

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

Why a Varying-Constants Multiverse Could Not be Verified By Verifying Theories Such as Inflation

Could we ever verify the theory of a varying-constants multiverse by verifying the theory of cosmic inflation, the idea that the universe underwent an exponential expansion during part of its first instant? No. I may first note that the prospect of being able to verify any theory of cosmic inflation is far dimmer than many now think. It is very doubtful that the current technique being pursued (based on looking for b-mode polarization) will ever provide any real verification. There are many sources of b-mode polarization that are not caused by inflation (gravitational lensing, dust, synchrotron radiation, and others), so trying to find a fingerprint of inflation is like trying to extract a DNA sample from a bandage that was passed around and shared by ten different people with bleeding wounds.

But even if scientists were to confirm a theory of cosmic inflation, that would not verify any theory of a varying-constants multiverse. For one thing, while some versions of the inflation theory imagine inflation producing multiple bubbles of space that might be called other universes, we would have no way of knowing whether such other bubbles of space had ever formed, as they would be forever unobservable. More importantly, we would have no license for assuming that such bubbles of space would be universes with fundamental constants that differed from our own. If one universe produced bubbles of space that branched off to become spatially separated from that universe, the most natural assumption is that such "universes" (or, more properly, other regions of the same universe) would have the same fundamental constants as their parent universe, particularly since science knows of no mechanism by which one universe could somehow produce a different universe with different fundamental constants.

The Impossibility of Verifying a Varying-Constants Multiverse By Launching Exploratory Expeditions

There is still one other technique that might be proposed for verifying the idea of a varying-constants multiverse: the technique of actually launching a mission into another universe. One can imagine some amazing machine that might allow us to travel from our universe to a different universe. In theory, if mankind or its successors were to launch several trips to other universes, and verify that they had different fundamental constants, that might verify the idea of a varying-constants universe.

But there are huge problems with such an idea. The first is that science offers no clue as to how we ever could travel to another universe. The idea seems like pure fantasy, a thousand times more fanciful and extravagant than the farfetched idea of instantly traveling to another star through a space-time wormhole.
The second reason is that if we were somehow to create some machine capable of traveling to another universe, there is no reason to think that it would be capable of traveling back to our universe or sending signals back to our universe (either of which would be necessary for any real verification to occur).

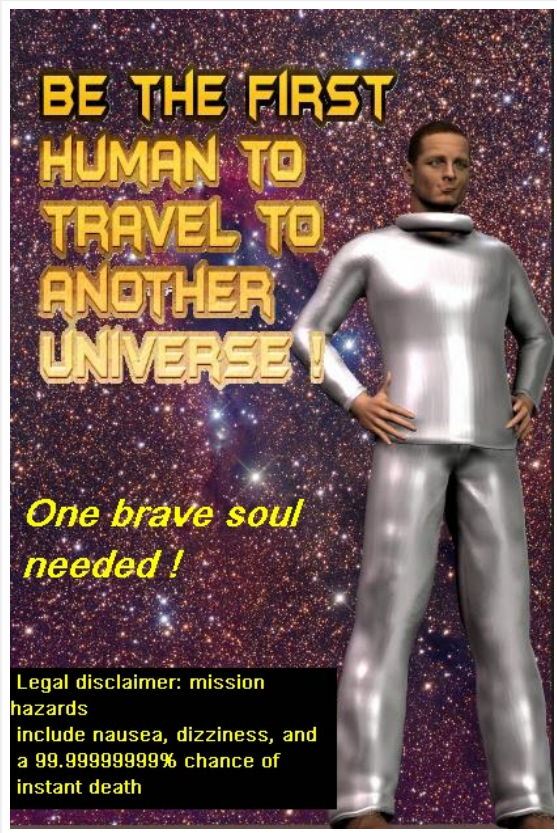
The third reason is that if we were somehow able to create a machine that traveled to another universe, it would still be all but impossible for such a device (or people or robots traveling in it) to verify that the other universe had a set of fundamental constants different from ours. The measurement of our universe's fundamental constants has taken decades of work by scientists around the world. There's no reason to think that a machine transported to another universe would be able to verify that the fundamental constants of that universe were different.

The fourth reason is that if one imagines the scenario of a varying constants universe (many universes, each with random fundamental constants), there would be an overwhelmingly high likelihood (such as 99.999999999%) that any machine transported to such a universe would be instantly destroyed, along with any robots of humans that came along for the ride.

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

To understand this point, you have to consider the astonishingly high degree of fine-tuning that allows stable matter to exist in our universe. In his book *The Symbiotic Universe*, astronomer George Greenstein says this about the equality of the proton and electron charges: "Relatively small things like stones, people, and the like would fly apart if the two charges differed by as little as one part in 100 billion." There are quite a few other cases of fine-tuning required for the existence of stable matter, including fine-tuning of the strong nuclear force.

So if we then imagine a machine being transported to another universe with random physical constants, we have to imagine the machine (and any one inside it) being instantly destroyed as soon as it was transported to another universe. With a 99.9999999% likelihood the coincidences which allow for stable atoms and molecules in our universe would not exist in such a universe. As soon as the machine got over to the other universe, its atoms and molecules would split apart, as the machine would (with overwhelming likelihood) no longer be in a universe which favored the existence of atoms and molecules.



A recruiting poster from 4000 AD ?

Because of these various reasons, we can conclude that there is no substantial possibility that any machine could ever be transported to another universe to help verify the concept of a multiverse consisting of many universes, each with a different set of fundamental constants.

Conclusion

It seems that it is quite impossible to ever verify the theory that there are multiple universes with varying fundamental constants. The theory is neither falsifiable nor verifiable. Consequently, the theory is more of a metaphysical theory than a scientific theory, as all truly scientific theories can be either verified or falsified under some reasonable scenario.

Posted by Mark Mahin at 11:05 AM No comments:

Labels: cosmic fine tuning, cosmic inflation, cosmology, fine-tuned universe, multiverse

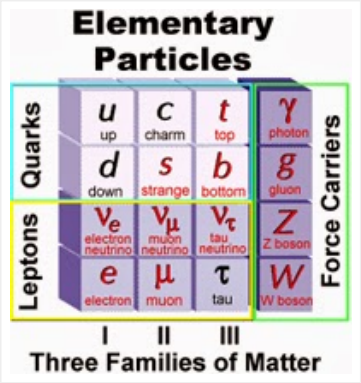
Sunday, February 16, 2014

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

Is There Any Flab in Nature's Fundamental Blueprint?

An interesting question to consider is whether the universe is built on a kind of blueprint that has a significant amount of excess or flab. If we look at the fundamental layout of particles, and find a great deal of excess and waste, this might perhaps tend to confirm the suspicions of many pessimistic thinkers that the universe is the daughter of pure blind chance.

Below is a typical diagram used to illustrate the Standard Model of particle physics, which is the closest thing we have to nature's fundamental blueprint.



Where here can we find some flab in nature – something that is hanging around, but is not needed?

We certainly could not get along without the Up quark or the Down quark, because they are the constituents of the protons and neutrons that make up the nucleus of an atom. There are two Up quarks and one Down quark in a proton, and two Down quarks and one Up quark in a neutron.

We also could not get along without the electron, as it is a vital part of any atom. As for the photon, that is certainly needed, as sunlight itself consists of photons. The gluon is needed because it is believed to play a key role in the strong nuclear force that holds together the nucleus of the atom.

There are also reasons (much less obvious) why we need the three types of neutrinos in the Standard Model (the electron neutrino, the muon neutrino, and the tau neutrino). Although they might seem to be useless "ghost particles," neutrinos are a critical element in supernovae explosions, the explosions of stars which create and spread around all of the heavier elements that are used in our civilization. Among the elements believed to be created entirely by supernova explosions are nickel, copper, zinc, germanium, selenium, tin, silver, gold, lead, and uranium. According to this link almost all of the energy of a particular supernova was transmitted through neutrinos. So we can't classify any of the neutrinos as being flabby parts of nature's blueprint. Living in an advanced industrial civilization, we can't dismiss as "useless" particles such as neutrinos that help to spread around the heavy elements needed for an advanced industrial civilization.

As for the W boson and Z boson particles, they are believed to play a crucial role in the weak nuclear force, which is believed to be important in supernova explosions. Such explosions are very useful for any industrial civilization needing heavy elements such as the elements listed above. This scientific paper says that there would not be enough oxygen if we did not have the weak nuclear force.

Not shown in the diagram above (but shown in other diagrams of the Standard Model) is the Higgs boson. That particle is believed to be vitally necessary because it helps to give mass to other vitally needed particles, as explained here.

So far we have found everything in the Standard Model to be useful. But we still have not discussed some particles that have sometimes been described as superfluous particles: the Charm quark, the Strange quark, the Top quark, the Bottom quark, the tau particle,

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

and the muon particle.

Here is an example of a scientist (Sean M. Carroll) who makes an argument that some of these particles show a case of flab or excess in nature, perhaps suggesting a poor design:

But in fact there is a better reason to be skeptical of the fine-tuning claim: the indisputable fact that there are many features of the laws of nature which don't seem delicately adjusted at all, but seem completely irrelevant to the existence of life. In a cosmological context, the most obvious example is the sheer vastness of the universe; it would hardly seem necessary to make so many galaxies just so that life could arise on a single planet around a single star. But to me a more pointed observation is the existence of "generations" of elementary particles. All of the ordinary matter in the universe seems to be made out of two types of quarks (up and down) and two types of leptons (electrons and electron neutrinos), as well as the various force-carrying particles. But this pattern of quarks and leptons is repeated threefold: the up and down quarks are joined by four more types, just as the electron and its neutrino are joined by two electron-type particles and two more neutrinos. As far as life is concerned, these particles are completely superfluous. All of the processes we observe in the everyday workings of the universe would go on in essentially the same way if those particles didn't exist. Why do the constituents of nature exhibit this pointless duplication, if the laws of nature were constructed with life in mind?

The previous paragraph is very densely packed with absurd and misleading reasoning. The first ludicrous claim (strangely referred to as “most obvious”) is that the vastness of the universe is somehow an argument against the idea that it is fine-tuned, with the lame suggestion that an intelligent designer would only be interested in creating one planet with life on it (rather than many planets with life). That is one of the silliest arguments I have ever heard, and makes as much sense as arguing that if there were a writer he would write no more than one sentence, being forever satisfied with having created just one. The next mistake is in insinuating that the second and third “generations” of quarks are somehow an example of superfluous excess. Carroll knows full well that the second and third “generations” of quarks have lifetimes of less than a millionth of a second, and that they decay into the very Up quarks and Down quarks that make up protons and neutrons, and are therefore absolutely necessary for our existence. More than 99.99999999999% of the quarks that actually exist in our galaxy are Down quarks and Up quarks (the other types never existing for more than a millionth of a second, and only in particle accelerators and a few freaky stars). The same thing is true for the tau and muon particles, which last than less than a second, and decay into the electron particle that is essential for our existence. So to complain of “pointless duplication” is wrong. There is no such duplication. The particles that Carroll calls “completely superfluous” particles are the direct ancestors of the vitally necessary particles, and are no more superfluous than your grandmother was superfluous to your existence.

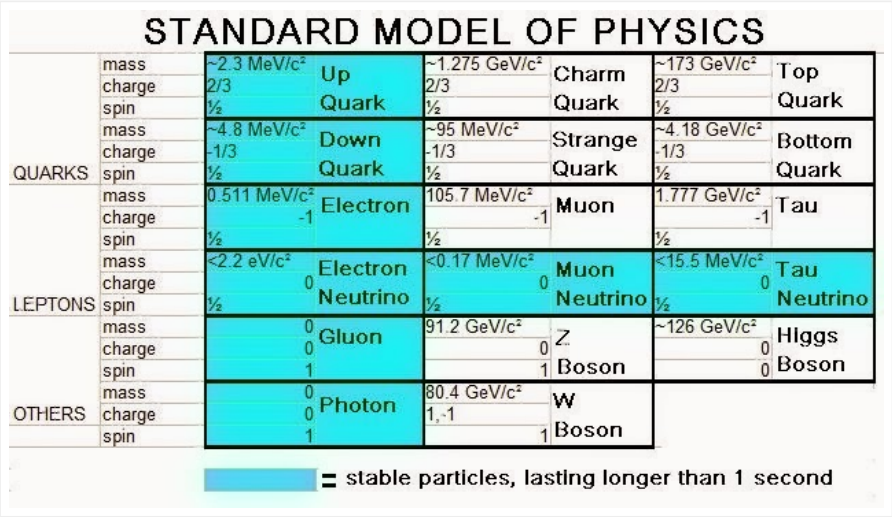
For physicists to speak of “generations” here is very apt to give you the wrong idea, because when you hear the term generation you think of the forty years of a human generation. But in reality the second and third “generations” of quarks exist for less than a millionth of a second before decaying (directly or indirectly) into the vitally necessary first generation. Complaining about that length of time as some example of wastefulness is like complaining if a short-order cook takes a millionth of a second to make your food.

As for the neutrino particles, it may be technically correct to say “the processes we observe in the everyday workings of the universe would go on in essentially the same way if those particles didn't exist.” But that is a very misleading turn of phrase, because as discussed earlier, if those neutrinos hadn't existed, supernova explosions (not an everyday occurrence) wouldn't work, the heavier elements would not have got spread around, and we wouldn't have here on Earth many of the elements used for industrial civilization. So neutrinos also cannot at all be classified as useless excess particles, some flab in nature's blueprint.

I will now introduce two tables that will help to clarify these points. The first table is an improved table showing the particles of the Standard Model, a table that will make clear which particles are stable particles lasting longer than a second, and which particles are

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

short-lived particles lasting less than a second. The stable particles are shown in blue. All other particles have lifetimes of only a tiny fraction of a second.



STANDARD MODEL OF PHYSICS

QUARKS	mass	~2.3 MeV/c²	Up Quark	~1.275 GeV/c²	Charm Quark	~173 GeV/c²	Top Quark
	charge	2/3		2/3		2/3	
	spin	½		½		½	
	mass	~4.8 MeV/c²	Down Quark	~95 MeV/c²	Strange Quark	~4.18 GeV/c²	Bottom Quark
	charge	-1/3		-1/3		-1/3	
	spin	½		½		½	
LEPTONS	mass	0.511 MeV/c²	Electron	105.7 MeV/c²	Muon	1.777 GeV/c²	Tau
	charge	-1		-1		-1	
	spin	½		½		½	
	mass	<2.2 eV/c²	Electron Neutrino	<0.17 MeV/c²	Muon Neutrino	<15.5 MeV/c²	Tau Neutrino
	charge	0		0		0	
	spin	½		½		½	
OTHERS	mass	0	Gluon	91.2 GeV/c²	Z Boson	~126 GeV/c²	Higgs Boson
	charge	0		0		0	
	spin	1		1		0	
	mass	0	Photon	80.4 GeV/c²	W Boson		
	charge	0		1, -1			
	spin	1		1			

= stable particles, lasting longer than 1 second

In judging whether there is flab in the Standard Model, we really need concern ourselves only with the particles shown in blue above. For the reasons given earlier, all of these particles are necessary. We know that neutrinos are necessary for the production of heavy elements in supernovae explosions. I don't think any one has ever done an analysis judging whether we would have as many heavy elements if one of these three types of neutrinos did not exist, so we should assume for now that all three are necessary for a universe with as many useful heavy elements as we have.

Another useful table is the table below. In this list I list each type of particle in the Standard Model, and I explain why each type of particle is relevant to life or civilization (in the sense of either being directly necessary itself for life or advanced civilization, or a particle that is a predecessor of some other particle that is relevant to life or civilization). The decay paths shown are typical decay paths, among the most common (a particle will often have multiple ways of decaying). To save space, I have not listed all the particles produced in the decays described, but only the relevant ones.

STANDARD MODEL OF PHYSICS

Q = Quark, N = Neutrino → = Very Rapid Particle Decay

Particle	Lifetime	Relevance to Life or Civilization
Up Q	Stable	Constituent of protons in atoms
Down Q	Stable	Constituent of protons in atoms
Charm Q	< 1 second	Charm Q→Strange Q→Up Q
Strange Q	< 1 second	Strange Q→Up Q
Top Q	< 1 second	Top Q→Bottom Q→Charm Q→Strange Q→Up Q
Bottom Q	< 1 second	Bottom Q→Charm Q→Strange Q→Up Q
Tau	< 1 second	Tau→Muon→Electron
Muon	< 1 second	Muon→Electron
Electron	Stable	Vital part of atom (like proton)
Tau N	Stable	Needed for supernovae that create heavy elements
Muon N	Stable	Needed for supernovae
Electron N	Stable	Needed for supernovae
gluon	Stable	Needed for strong nuclear force
photon	Stable	Needed for sunlight
Z Boson	< 1 second	Needed for weak nuclear force
W Boson	< 1 second	Needed for weak nuclear force
Higgs Boson	< 1 second	Gives mass to electrons

Unnecessary stable particles: 0

Particles irrelevant to life and civilization: 0

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

Notice the important summary at the bottom of the chart. Considering only regular matter (not antimatter), and considering a particle to be relevant to life or civilization if it is either directly relevant or decays into some other particle that is relevant to life or civilization, I find that there are zero unnecessary stable particles, and zero particles irrelevant to life or civilization.

Like most tables summarizing the Standard Model, these visuals do not depict any antiparticles. But what if we were to consider antiparticles? Aren't antiparticles a great example of pure flab in nature's fundamental blueprint?

There are two reasons why antiparticles should not be considered as flab in nature's fundamental blueprint. The first reason is that there seem to be subtle reasons why our universe would not work right or not be stable if antiparticles did not exist. In his book *Symmetry and the Beautiful Universe* (page 234), Nobel Prize winning physicist Leon M. Lederman suggests complicated reasons why "the whole universe could not be stable" if antiparticles were not part of the overall blueprint.

The second reason is simply that antiparticles don't exist in nature for more than a tiny fraction of a second. This is because whenever an antiparticle comes into contact with a regular particle, both are converted into energy. As there seems to be no evidence that even 0.00000000001 percent of the universe is antimatter, one can't plausibly cite antimatter as an example of flab in nature's fundamental blueprint.

Could we perhaps cite dark matter or dark energy as an example of flab in nature's fundamental blueprint? No, not at all. Neither dark matter nor dark energy is covered by the Standard Model, so we are pretty "in the dark" here (pardon the pun). But scientists do think that dark matter seems to be a vital element in explaining the current structure of the universe, and that galaxies would not even hold together without it. Scientists also say that galaxies would not have expanded at a suitable rate (and galaxies would not have formed) if dark energy did not exist.

So we have looked for flab in nature's fundamental blueprint, and we have come up short. The blueprint seems to be flab-free. We might say that nature's fundamental blueprint is lean and mean. Metaphorically, we might say it is composed essentially of nothing but muscle and bone.

We can easily imagine a universe with lots of flab in its fundamental blueprint, a universe with thousands of different types of stable particles cluttering up space, with only a few of them being the type that combine together to make atoms. Our universe has no resemblance to such a universe.

Posted by Mark Mahin at 11:39 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmology, particle physics, philosophy

Saturday, January 18, 2014

Why We Shouldn't Exist: A Table of 18 Anthropic Requirements

The Standard Model is regarded as a highly "unnatural" theory. Aside from having a large number of different particles and forces, many of which seem surplus to requirement, it is also very precariously balanced. If you change any of the 20+ numbers that have to be put into the theory even a little, you rapidly find yourself living in a universe without atoms. This spooky fine-tuning worries many physicists, leaving the universe looking as though it has been set up in just the right way for life to exist.

- things science cannot explain (5)
- third man factor (1)
- time dilation (1)
- time travel (3)
- tininess of human knowledge (16)
- top-down theory of mind (1)
- Transhumanism (3)
- Twitter (1)
- types of universes (2)
- UFO (9)
- UFOs (6)
- universe (8)
- vacuum (3)
- vacuum catastrophe (3)
- vegetarianism (2)
- Venus (1)
- Venus colonization (1)
- videos (1)
- virtual reality (2)
- vitalism (3)
- von Neumann probes (2)
- water memory (1)
- wealth inequality (4)
- weddings (1)
- white holes (1)
- wormhole (1)

Harry Cliff, Particle Physicist, in a Scientific American article

If you have not read much on the topic of the anthropic principle and the issue of possible fine-tuning in the universe, it may be hard to follow the topic. Discussions typically involves subatomic physics, cosmology, biology, evolution and some other subjects that don't exactly make light reading. I think that the topic will be easier to understand if we condense it into one simple table that summarizes the most relevant facts. I have created such a table, which appears below.

The left column of the table lists various items that appear in nature. The right column lists requirements of those items. The table is in chronological order. It starts out with requirements that must be met in the very beginning, near the time of the Big Bang, if the universe is ever going to end up with people like us, inhabitants of a technical civilization living near a sunlike star. Towards the end of the table are items that appeared billions of years later in time. The final item in the table is "Civilizations near sunlike stars." It is interesting that for the last item to come into existence, all of the previous items in the list must previously come into existence. I have added color coding which makes the various interlinked dependencies much easier to follow.

Item	Requirements (Direct or Indirect)
Higgs field	Fine-tuning to 15 decimal places
Up quark, down quark, electrons	Currently unexplained matter/antimatter asymmetry, Higgs field
protons, neutrons	up quark, down quark
hydrogen atoms	protons, electrons, electromagnetic force
Galaxies	Fine-tuning of expansion rate, density perturbations, dark energy, dark matter, photon/baryon ratio, gravitation
carbon atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing carbon in stars
Oxygen atoms	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong nuclear force, nuclear resonances producing oxygen in stars, weak force
Heavier atoms (with more than about 25 protons)	Protons, neutrons, electrons, Pauli Exclusion Principle, electromagnetic force, strong force, weak nuclear force and neutrinos causing supernovae
Sunlike stars	Galaxies, fine-tuning of (1) gravitation (2) electron mass (3) Planck's constant (4) speed of light
water	Oxygen atoms, hydrogen atoms
Stable planets	Gravitation, equality of proton charge and electron charge to many decimal places (for planet to hold together)
Nucleotides	oxygen atoms, carbon atoms, molecular bonding requirements
Genetic code	Huge enigmatic requirement -- "programming code from chemicals"
RNA	Nucleotides, Genetic code, water
DNA	RNA, nucleotides, Genetic code, water
Proteins, cells	DNA, RNA, Genetic code, water
Photosynthesis	Exotic quantum effects
Civilizations near sunlike stars	Heavier atoms, sunlike stars, stable planets, proteins, cells, photosynthesis, important unknown other requirements allowing Mind to arise from matter

Click to Expand

I will now explain why each item has the requirements I have listed.

Row 1 (Higgs field): The Higgs field (related to the Higgs boson) is said to give mass to other particles. Scientists are puzzled by why the Higgs field has the strength it has, and they say that it seems to require fine-tuning to 15 decimal places. This is a problem called the hierarchy problem or the naturalness problem. It is discussed in this scientific paper entitled *The Higgs: so simple yet so unnatural*. As a Daily Galaxy article put it, "Using theory as it currently stands, the mass of the Higgs boson can only be explained as the result of a random fine-tuning of the physical constants of the universe at a level of accuracy of one in one quadrillion."

Row 2 (up quarks and down quarks, electrons): The particles in the nuclei of atoms (protons and neutrons) are made up of smaller particles called up quarks and down quarks. A requirement of the large-scale existence of up quarks and down quarks (and also electrons) is what scientists call matter/antimatter asymmetry (a situation where matter is vastly more abundant than antimatter). This is a puzzle to scientists, because the standard model of physics seems to predict that matter and antimatter should have existed in equal amounts at the time of the Big Bang, which would have caused both types of particles to collide with each other and convert into energy, leaving almost nothing but energy in the universe. A requirement for electrons is the Higgs field, and on this page a physicist says that the electron would not have mass without the Higgs field.

Row 3 (protons, neutrons): The simple requirement is that there be up quarks and down quarks, discussed in the previous paragraph.

Row 4 (hydrogen atoms): The requirement for a hydrogen atom is that you have one proton and one electron, and also the electromagnetic force, the force of attraction between a proton and an electron. Without that force, electrons would not have any tendency to orbit a nucleus.

Row 5 (galaxies): Galaxies are huge collections of stars. There are many requirements for the formation of galaxies after the Big Bang. The universe had to begin with a fine-tuned expansion rate, as a slighter higher rate would have caused an expansion too fast for galaxies to form, and a slightly slower rate would have caused all matter to collapse into superdense black holes. Scientists also say that numerous other things had to be just right (the other items listed in this row). One requirement is primordial density perturbations greater than .000001 and

less than .0001, as explained here. One particularly severe requirement seems to involve dark energy, which is regarded pretty much the same as the cosmological constant. Cosmologists conclude that the level of dark energy seems to have been fine-tuned to something like 1 part in 10^{60} or one part in 10^{120}. The issue, called the vacuum catastrophe, has been fretted over by many physicists. This paper refers to the "tremendous, unsolved naturalness problem" posed by the cosmological constant.

Row 6 (carbon atoms): This row refers to the abundant existence of carbon atoms, something which ends up having lots of requirements. Besides the previously mentioned requirements for the hydrogen atom (protons, electrons, and the electromagnetic force), there are the additional requirements of the neutron and the strong nuclear force (the two of them allow you to have a carbon nucleus that holds together, despite the mutual repulsion between the protons). There is also the requirement that you have a law of nature called the Pauli Exclusion Principle, something that is quite necessary for both solid matter and complex carbon bonds. Then there is an additional requirement for something called nuclear resonances, which assures that carbon is produced in abundant quantities by stars through a process called the triple alpha process. Without this additional requirement, there would not be enough carbon (which wasn't produced in the Big Bang). This point has been widely discussed by scientists such as Hoyle, and in this scientific paper stating that a 0.4% change in one parameter would have left us without a universe abundant in both carbon and oxygen. An additional requirement that I had no space to list in my table is the requirement that the neutron mass be higher than the proton mass.

Row 7 (oxygen atoms): Oxygen atoms have all the same requirements of carbon atoms, including the same special requirement involving nuclear resonances, necessary for oxygen to be produced by stars in abundant amounts. The scientific paper here argues that there would not be much oxygen without the weak nuclear force, so I have also listed that as a requirement.

Row 8 (Heavier atoms): By heavier atoms I mean all atoms than have more than about 25 protons (which includes copper, lead, silver, gold, zinc, tin, and probably also iron). These types of atoms have most of the same requirements of carbon atoms and oxygen atoms, except that to have these atoms in abundance you don't need nuclear resonances but instead the stellar explosions called supernovae explosions (explosions of stars that produce heavy elements such as lead and iron). These supernovae explosions require a tiny particle called the neutrino and a force called the weak nuclear force.

Row 9 (Sunlike stars): I may define sunlike stars as those

that are white, yellow, or orange (or some combination of those colors). Sunlike stars require galaxies (since if galaxies had not formed, there would be no stars). Sunlike stars also require a very delicate fine-tuning of some of the most fundamental constants of nature. The physicist Paul Davies says on page 73 of *The Accidental Universe*: “If gravity were *very* slightly weaker, or electromagnetism *very* slightly stronger (or the electron slightly less massive relative to the proton), all stars would be red dwarfs. A correspondingly tiny change the other way, and they would all be blue giants.” Blue giants are too-short lived for life to evolve near them, and red dwarf stars are not believed to be as favorable for life's evolution as sunlike stars.

Row 10 (water): Water requires oxygen atoms and hydrogen atoms, as we can tell from its formula H_2O. Because of its remarkable features that make it unique among liquids, there are probably additional requirements for water, but I haven't listed them.

Row 11 (stable planets): One requirement for stable planets is gravitation, the force that holds planets and stars together. But there is another very interesting requirement: that the electric charge of the proton exactly match the electric charge of the electron, to many decimal places. Electromagnetism (the fundamental force involving electric charges) is roughly 10^{36} times stronger than gravitation, the weakest of the fundamental forces by far. Consequently a very slight mismatch between the charge of the electron and the proton would cause electromagnetism (roughly a trillion trillion trillion times stronger than gravitation) to completely overwhelm the gravity holding the planet together. In his book The Symbiotic Universe, astronomer George Greenstein (a professor emeritus at Amherst College) says this about the equality of the proton and electron charges: "Relatively small things like stones, people, and the like would fly apart if the two charges differed by as little as one part in 100 billion. Large structures like the Earth and the Sun require for their existence a yet more perfect balance of one part in a billion billion." In fact, experiments do indicate that the charge of the proton and the electron match to eighteen decimal places.

RATIO OF PROTON MASS TO ELECTRON MASS:
1836.152672
RATIO OF PROTON CHARGE TO ELECTRON CHARGE:
1.000000000000000

A curious coincidence

Row 12 (nucleotides): Nucleotides are molecules that are the building blocks of RNA and DNA, molecules essential for life. Nucleotides require three types of atoms mentioned above (carbon, oxygen, and hydrogen atoms), as well as phosphorus atoms. They also require physics to be arranged in a way that allows for atoms to combine to make molecules consisting of multiple atoms.

Row 13 (genetic code): The genetic code is a semantic framework used by DNA and RNA, one in which particular combination of nucleotides stand for particular amino acids. The genetic code could roughly be called the software used by DNA and RNA. The origin of this code is one of science's great mysteries. We do not know how this code (required for all biological evolution) appeared from mere chemicals. This is the "code from chemicals" problem described in this blog post.

Row 14 (RNA): RNA is one of the two main molecules used by all living things, and it is believed to have preceded the more well-known and more complicated molecule DNA. It requires nucleotides (from which RNA is built), as well as the genetic code and water (as a substrate).

Row 15 (DNA): DNA requires nucleotides (from which it is built), as well as the genetic code and water. I also list RNA as a requirement since it is believed that RNA was a necessary predecessor of DNA.

Row 16 (Proteins, cells): Proteins are made by DNA and RNA using the genetic code. Requirements include water and amino acids (which I didn't list in the table for space reasons).

Row 17 (Photosynthesis): Photosynthesis is the process by which plants convert sunlight to chemical energy. Recent studies suggest that photosynthesis uses exotic quantum effects.

Row 18 (Civilizations near sunlike stars): Now we come to the last and most important row, which mentions civilizations such as our civilization. There are many requirements for such a civilization. All of the items on the 17 previous rows on the table are indirect or direct requirements of civilizations near sunlike stars. The well-understood direct requirements of such civilizations are heavier atoms (needed so that the civilization can have the metals needed for technology), sunlike stars, stable planets, proteins, cells, and photosynthesis (the last one being necessary even if the beings in a civilization ate nothing but meat, because they would still rely on a food chain that would require photosynthesis).

There is also a poorly understood requirement that does not occur previously on the list – the requirement that somehow unconscious matter can produce Mind of the type that humans

have. That is a huge additional requirement. It may require additional laws of nature, or perhaps exotic features of quantum mechanics, as Penrose and Hameoff have suggested. Penrose and Hameroff say here that their "orchestrated objective reduction" theory "suggests that there is a connection between the brain's biomolecular processes and the basic structure of the universe," and yesterday's news reported a finding that supports such a theory. The matter is still undecided, but we do seem to have a huge additional requirement from nature in order to go from mere cellular life to conscious life.

The table I have created illustrates the great number of intertwining requirements needed for the universe to be consistent with the eventual appearance of civilizations such as ours. A huge amount of fine-tuning is required to meet these requirements, most notably in rows 1, 5, 9, and 11, each of which require "1 in a trillion" type coincidences with a very low likelihood of randomly occurring, We also have the very mysterious requirements of rows 13 and row 18, both of which almost seem to require "blood from stone" type of requirements (row 13 involving the origin of the genetic code from chemicals, and row 18 involving the origin of human-like consciousness from mere matter).

The severe improbability of accidentally meeting all these requirements by chance is the reason I have entitled this blog post "Why We Shouldn't Exist: A Table of 18 Anthropic Requirements." We can say that we shouldn't exist, in the sense that our existence seems to require an almost miraculous conspiracy of conveniences, coincidences and fine-tuning within nature. As Stephen Hawking and Leonard Mlodinow said in their book *The Grand Design* (page 161), "The laws of nature form a system that is extremely fine-tuned, and very little in physical law can be altered without destroying the possibility of the development of life as we know it."

Postscript (2/14/14): The table of anthropic requirements above is not at all a complete list of all of the requirements for creatures like us to exist. For example, I didn't list a major additional requirement for atoms: a dependency on Heisenberg's Uncertainty Principle. As discussed here, were it not for this law of nature, electrons would fall into the nucleus of an atom, preventing any type of atom from existing.

Posted by Mark Mahin at 7:07 AM 1 comment:

Labels: anthropic principle, Big Bang, cosmic fine tuning, cosmology, evolution, galaxies, galaxy formation, particle physics, philosophy

Tuesday, January 7, 2014

The Theory of a Programmed Material Universe

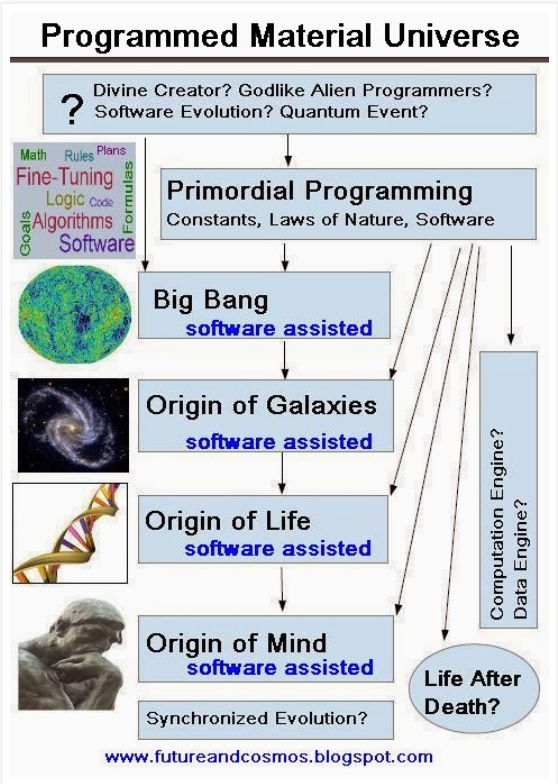
In my previous blog post *Nature's Computation Needs Imply a Programmed Material Universe*, I introduced a theory that the universe has a computation layer

that includes software. My reasoning was based on the argument that we must assume such a layer in order to properly explain the incredibly high level of computation that nature is apparently doing all of the time. The reasoning I presented in that post was only half of the case for such a theory. The other half of the case (which this blog post will explore) is the need for such a theory to help explain the amazing and improbable evolution of the universe since the time of the Big Bang. I may note that this theory of a programmed material universe postulates that the universe is quite real and not any type of illusion (in contrast to theories imagining that the universe is merely a simulation, theories I reject).

First, let us consider: if the universe does have a computation layer that includes software, how old is such a layer? If modern science told us that the universe existed for many billions of years in a state of complete disorder, and then gradually evolved over many, many billions of years to a state of somewhat greater order, then it might be plausible to advance some theory involving the gradual evolution of a computation layer within the lifetime of our universe. But that is not what modern science tells us about the past of our universe. Astronomers tell us that the universe began about 13 billion years ago in the Big Bang, a state of fantastically high density (indeed, infinitely high density if general relativity is to be believed). Cosmologists tell us that the behavior of the Big Bang was in several ways remarkably fine-tuned, and we know that nature has been behaving in an astonishingly orderly way from the very beginning. So if we are going to postulate a computation layer as part of the universe, we must assume that such a layer has existed from the very beginning, from the time of the Big Bang.

Two Diagrams that Visualize the Theory

Below is a diagram showing how the theory of a programmed material universe can be related to the evolution of the universe (click the diagram to expand it):



Click to Expand

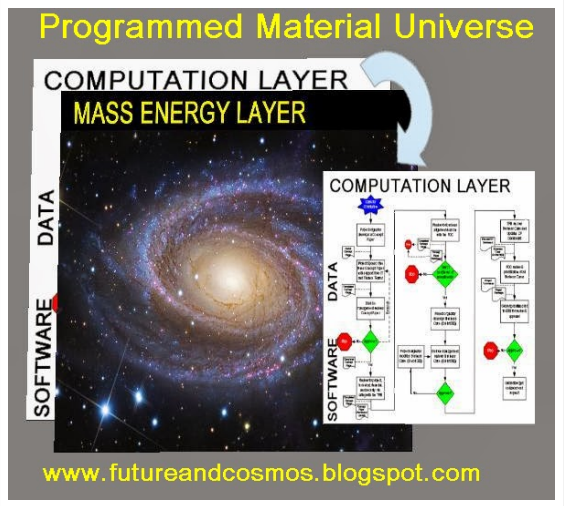
In this diagram we see one block marked “Primordial Programming” which includes constants, laws of nature, and software. The assumption of software existing from the very beginning is a new assumption made by the theory of a programmed material universe. Scientists have assumed that fundamental constants (such as the speed of light, the gravitational constant, and Planck's constant) have existed from the time of the Big Bang, and they have assumed that laws of nature have existed since the time of the Big Bang. But the assumption

that software has existed from the beginning is a new theoretical element characteristic of the theory we are discussing (the theory of a programmed material universe). I use the term software to simply mean programming. One way to define programming is processing that produces desirable outputs, typically from a set of inputs. There is probably a better and more general way to define programming, but that definition will do for the moment.

Note that in this diagram I have a single rectangle that mixes together constants, laws of nature, and software. This is intentional, because we apparently need to imagine these things as being intermingled. Many of the laws of nature may need to be conceived as aspects of the software that has existed from the beginning, according to the theory of a programmed material universe. The fundamental constants of nature may also need to be conceived as elements that are part of the universe's software (just as constants are declared within computer programs).

Purely for space reasons, the diagram depicts the Big Bang rectangle as underneath the Primordial Programming rectangle, but from a chronological standpoint we can imagine these both originating at the same time, at the beginning of the observable universe some 13 billion years ago (the Big Bang).

Another diagram that illustrates the theory is the one used in my previous blog post, where I depict a computation layer co-existing with a mass-energy layer, as shown below. I mentioned that we should imagine these two layers as being intermingled (rather than one floating above the other).



What Could Have Caused Primordial Programming?

If we imagine that the universe has had from the beginning a computation layer that includes software, we then have the question of: where did this software come from? The answer given in the first rectangle of my first diagram is: unknown (as I indicate by using a big question mark). But I can briefly discuss some possibilities mentioned in the first rectangle of my first diagram. I discuss these reasons merely to show that there might be some explanation for why the universe might have a computation layer that includes software.

One possibility is the idea that the computational layer was put in place by a divine creator, perhaps a being with some attributes of great power and wisdom, as imagined by quite a few theologians or philosophers. The fact that the theory of a programmed material universe may lead many to think of such a possibility is no defect of the theory as compared to the regular theory of a Big Bang, because the regular theory of a Big Bang is also suggestive of such a possibility.

A second possibility is that the primordial programming may have been put in place by godlike aliens that arose in a phase of the universe prior to the Big Bang. General relativity indicates that nothing existed prior to the Big Bang, so this possibility is extremely speculative. But if there was some existence of the

universe prior to the Big Bang (unlikely as that may be), there conceivably could have evolved some civilization lasting millions of years, and the beings in such a civilization might have developed godlike powers from eons of technological development. Just conceivably, such beings could have caused our universe to acquire the programming that it seems to have. I don't consider this to be a very likely possibility, but I am mentioning it for the sake of completeness.

A third possibility is that somehow the universe could have acquired its current programming (as postulated by the theory of a programmed material universe) through a process of software evolution that might have carried through one or more previous cycles or phases of the universe prior to the Big Bang. As someone who has written automatic code generators more than once, I know that software does not necessarily have to be produced directly by a conscious programmer. Very advanced software can also itself produce other software. So conceivably there could have been previous software in a previous cycle or phase of the universe (prior to the Big Bang), and that might have somehow spawned the programming that seems to have existed in our universe from the time of the Big Bang.

A fourth possibility is the possibility that there simply was some *ex nihilo* quantum event that brought our current universe into existence at the time of the Big Bang, along with the programming that our universe seems to have had since that time. Such a scenario is admittedly farfetched, but it only seems to be slightly more farfetched than the notion that the whole physical universe could have popped into existence from nothing (a possibility that quite a few physicists take seriously).

To accept the theory of a programmed material universe, it is not at all necessary to take any position on which of these possibilities is the correct one, or whether any of them is likely. We can simply leave the origin of the primordial programming as a great big question mark. That is pretty much what scientists do in regard to the Big Bang itself.

Given this wide range of possibilities, only one of which is theistic, we can say that the theory of a programmed material universe is a religiously neutral theory, and that it does not at all require any belief in the current existence of any deity. It could be argued, however, that the theory is a somewhat “theism-friendly” theory. But you could say the same thing about the Big Bang theory itself, with its unexplained sudden appearance of the universe.

A Software-Assisted Evolution of the Universe

You may note that in my first diagram there are four rectangles containing the phrase “software assisted,” one for the Big Bang, another for the origin of galaxies, another for the origin of life, and another for the origin of Mind. “Software assisted” here means the same as “aided by programming.” Why postulate that such momentous events were software-assisted?

The software that we know of often tends to be goal-oriented. For example, when you go to the Amazon web site, you do not encounter software that is indifferent to whether or not you will place an order at that web site. Instead you encounter software that has a goal, which in this case is the goal of encouraging and recording some purchase by you. So if we assume that the universe has had very complicated programming from the very time of the Big Bang 13 billion years ago, it is reasonable to assume that such software is to some degree goal-oriented. This does not at all mean that we have to assume any self-conscious wishes in such software. Unconscious software can have goals. After I die there will still remain in my computer files some computer programs that have particular goals, but such programs will be utterly unconscious.

But why is it that we might need to postulate that some primordial programming has assisted the universe throughout its evolution? The main reason is because of

the great unlikelihood of the universe reaching so many milestones of success without any assistance from any such programming.

Here is a quick summary of the amazing history of the universe. Thirteen billion years ago the universe starts out in the Big Bang, in a state of apparently infinite density (according to general relativity). The universe manages to expand at just the right speed for galaxies to successfully form, even though scientists say that what is called the critical density had to be fine-tuned to fifty decimal places (an issue known as the flatness problem). Somehow even though the opposite regions of the universe were causally disconnected, they managed to somehow conspire to expand at an amazingly coordinated rate (the horizon problem), leaving us with a universe that is remarkably homogenous and suitable for the evolution of life. Then much later, from this explosive event of unimaginable heat and density, there somehow arose not a ruined wreck resembling the aftermath of an H-bomb, but instead a very orderly universe consisting of galaxies, with most stars existing in beautiful spiral galaxies. Billions of years later, there then somehow arose from mere heat and chemicals the marvelous bit of programming called the genetic code, required before biological evolution can even begin. There then arose life. Then much later from mere unconscious matter there somehow arose a completely different type of thing: self-conscious mind, of the type humans have.

This is a story of improbable success more mind-boggling than some Hollywood tale of a penniless street beggar marrying the princess of an exotic land. To make this story more believable, we need to postulate something extra. This is exactly what this theory of a programmed material universe can do, by describing a universe which had its evolution assisted by a computational layer that includes software that has existed since the beginning of the universe.

It is true that scientists have some theories that attempt to explain some of the remarkable evolution of the universe. There is an inflation theory designed to reduce the fine-tuning of the Big Bang. There is also a "lambda cold dark matter" theory designed to explain the origin of galactic structure. There is an RNA World theory designed to explain the origin of life. There are also attempts to explain the origin of human mental faculties from Darwinian evolution (which often resort to arguing that man is basically just a chimp, or man is like a robot, or that self-consciousness is merely a by-product of brain activity similar to the gravy that is a by-product of cooking a turkey).

But in general these theories are weak, cheesy, or insufficient. See my previous post *We Do Not Understand How the Universe Came to Look This Way* for a discussion of severe difficulties in the "lambda cold dark matter" theory designed to explain the origin of galaxies. See my previous post *The Origin of Life: Programmatically Predestined?* for a discussion of some severe difficulties in the RNA World theory, one of which is the near impossibility of explaining how the genetic code could have arisen through evolution from mere chemicals. See my previous post *Darwinism Fails to Explain Man's Higher Faculties* for a full discussion of the very great difficulty in explaining the origin of self-conscious Mind from mere natural selection (a point that NYU professor Thomas Nagel has argued at great length in his book *Man & Cosmos*). I have not yet got around to putting up a post devoted to making a critique of the cosmic inflation theory, but I will do so. The Princeton cosmologist Paul Steinhardt has made some quite severe criticisms of that theory, in articles such as this one. There are so many special requirements of the cosmic inflation theory (for an inflation phase to both begin and end successfully) that even if you accept it you are still left with a great deal of unexplained fine-tuning in the Big Bang.

So we need something extra to explain the universe's amazingly successfully evolution from infinite density to planets where beings like us exist. The theory of a programmed material universe gives us that something extra. We can suppose that again and again throughout its history the universe has reached an outcome that was wildly improbable to occur by pure chance, because the universe behaved as it was programmed to behave from the beginning.

But how is it that favorable events occurring in the universe's history could have been "software assisted" as I suggest in the first diagram? Think of it as I did in placing constants, laws of nature, and software in a single block labeled "Primordial Programming." The three of these are intertwined. If there is programming behind the laws of nature (and if many of what we call the laws of nature or fundamental constants are simply aspects of that programming), then cosmic software or primordial programming is a kind of cosmic controller that can achieve any physical results. From this perspective, the programming doesn't have to follow the rules; instead the programming makes the rules, or to a large extent the programming and the rules are the same thing. So if we suppose programming has been behind the laws of nature from the beginning, we can envision that programming as a kind of teleological impetus that can achieve any physical result that is consistent with the programming itself.

If there were no reasons for believing in such a theory other than the usefulness of such a theory in explaining the universe's evolution, and the appearance of life and self-conscious Mind, then there might not be a sufficient warrant for such a theory. But in my previous blog post I did explain many other reasons for adopting such a theory. In that post I showed that when we examine the computation requirements of nature, we find again and again that nature seems to be doing almost infinite amounts of rule-based computation, that often bears an uncanny resemblance to what we see going on in computer programs. We therefore have a full spectrum of powerful reasons for postulating this theory of a programmed material universe.

Optional Features of the Theory: "Luxury Accessories"

I will now discuss two additional parts of my first diagram: the "Synchronized Evolution?" box and the "Life After Death?" box. Both of these are very much "luxury accessories" of the theory of a programmed material universe, not at all integral parts of the theory (rather like optional features you may choose when ordering a car from a car dealer).

As for the "Life After Death" box, it is a fact that very many advanced software systems have a feature called auto-save, where the system says: *I've detected something worth saving, so let me automatically save it*. If we postulate that the universe has a built-in computation layer that includes software, it is then possible to imagine without too great a leap that the universe's primordial programming might include some functionality that automatically causes (or helps to cause) advanced consciousness to somehow survive death. From such a perspective it might conceivably be that life after death is just another feature in the feature set of the universe's programming. I will mainly leave it to others to debate how likely such a possibility may be, and at this time I have nothing but very vague thoughts about the matter.

Another "luxury accessory" of the theory of a programmed material universe is the possibility of synchronized evolution. If we assume that the universe's evolution is being assisted and perhaps even controlled by some computation layer of the universe that includes software, it is possible that rather than occurring at random time intervals, the evolution of intelligent life may occur in a synchronized manner. The universe could be programmed for intelligent life to appear throughout it at the same time. There may be throughout the universe a target date for the evolution of intelligent life, some date close to the present.

Why even consider such a possibility? The main reason is that such a possibility offers a new potential solution to one of the great mysteries of the universe: the "where is everybody?" mystery known as Fermi's Paradox. If intelligent life is appearing simultaneously throughout the universe, then the long-standing Fermi's Paradox mystery dissolves away, and we can say: they are not here, because they are no more evolved than we are. But I think this synchronized evolution possibility is somewhat unlikely, so I suggest it merely as an optional hypothesis.

These two possibilities (life after death and synchronized evolution) are not at all

predictions of the theory of a programmed material universe; they are merely possibilities that might be more likely if such a theory is true.

Cosmic Fine Tuning and the Theory of a Programmed Material Universe

One of the most important discoveries during the past 40 years has been the discovery of cosmic fine tuning, the many ways in which the universe seems to be tailor-made for the evolution of intelligent life. Scientists have been extensively discussing the topic for about 40 years, often while discussing what is called the anthropic principle.

You can find a good introduction to the topic in this scientific paper and my long blog post *Cosmic Fine Tuning Visualized*. In that blog post I used a metaphor of a slot machine with 8 rows that must each have all matching symbols for the universe to be compatible with the appearance of intelligent life (the rows being labeled gravity, particle charges, entropy, expansion rate, particle masses, element abundances, and nuclear forces). The chance of pulling the lever and getting a match on all 8 rows is 1 in 10^{48}, one chance in a trillion trillion trillion trillion.

Metaphorical Visualization of Cosmic Fine Tuning

The discoveries about cosmic fine tuning don't fit in with the tendency of physicists to regard the universe as being a blind and random thing ruled by chance. Modern physicists have generally reacted to the discoveries of cosmic fine tuning with a combination of interest and complete bafflement, rather like a deer caught in the headlights.

Some physicists have reacted to all the evidence for cosmic fine-tuning by "running scared" to a theory of a multiverse (an ensemble of a vast number of universes). But while the theory of a multiverse might make it seem more likely that *some* universe (1 in a "zillion") might randomly have the conditions necessary for intelligent life, such a theory does nothing at all to make it seem more likely that *this* universe would have had by chance the conditions necessary for intelligent life. (Although they sound very similar, there is a world of difference between “some x” and “this x.” For example, the chance of *some* lottery ticket holder winning the next Powerball lottery is 100%, but the chance of *this* lottery ticket holder – myself -- winning that lottery is less than 1 in a million.)

We are long, long overdue for a theory of the universe in which cosmic fine-tuning fits in naturally, rather than being some embarrassing exception that stands

out like a sore thumb. The theory of a programmed material universe is such a theory. It meshes very well with what we know about cosmic fine-tuning.

Fine-tuning is something that one expects to see in any good software system. So under a theory that the universe has a vitally important computation layer in which software is a very important part, we should expect to see cosmic fine-tuning. In fact, many of the things that are cited as cosmic fine-tuning may simply be considered aspects of the universe's built-in programming.

Cosmic fine-tuning and a theory of a programmed material universe fit together like a hand and a glove, which is a strong advantage of this theory.

The Teleological Nature of the Theory

The theory I have advanced here is clearly teleological, in the sense of imagining nature moving towards goals (not because it is self-conscious, but because it includes goal-oriented programming). But this teleological aspect is no defect in the theory. In his book Mind & Cosmos, NYU Professor Thomas Nagel (himself an atheist) argues with great force that reductionist materialistic explanations for the origin of life and the origin of human consciousness have been insufficient. Nagel argues that we need some new teleological theory, one that postulates "a cosmic predisposition to the formation of life, consciousness, and the value that is inseparable from them." Lengthy excerpts from his book are here and here. The theory I have advanced may fit most of his prescription.

Posted by Mark Mahin at 7:14 AM No comments:

Labels: anthropic principle, Big Bang, cosmic destiny, cosmic fine tuning, cosmology, origin of life, origin of Mind, philosophy, programmed material universe, theories of the universe

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Saturday, November 23, 2013

Cosmic Fine-Tuning Visualized

The evolution of the cosmos is determined by initial conditions (such as the initial rate of expansion and the initial mass of matter), as well as by fifteen or so numbers called physical constants (such as the speed of the light and the mass of the electron). We have by now measured these physical constants with extremely high precision, but we have failed to come up with any theory explaining why they have their particular values. One of the most surprising discoveries of modern cosmology is the realization that the initial conditions and physical constants of the universe had to be adjusted with exquisite precision if they are to allow the emergence of conscious observers. This realization is referred to as the "anthropic principle"...Change the initial conditions and physical constants ever so slightly, and the universe would be empty and sterile; we would not be around to discuss it. The precision of this fine-tuning is nothing short of stunning. The initial rate of expansion of the universe, to take just one example, had to have been tweaked to a precision comparable to that of an archer trying to land an arrow in a 1-square-centimeter target located on the fringes of the universe, 15 billion light years away!

"Chaos and Harmony" by Trinh Xuan Thuan, Professor of Astronomy, University of Virginia, p. 235

The phrase cosmic fine-tuning is nowadays used in a theologically neutral sense to mean the universe's improbable fitness for life (the term may or may not imply the existence of a fine-tuner). One of the first books on the anthropic principle discussed above was Paul Davies' book *The Accidental Universe*, which had a cover showing a pair of dice and a galaxy.

But rather than imagining a dice-throwing Las Vegas crapshooter to visualize the idea of cosmic fine-tuning, we should perhaps imagine something else in Las Vegas: a slot machine. The slot machine that we need to imagine is one that has not one row that must consist of matching symbols for a win, but a slot machine with multiple rows, each of which must have matching symbols to win the jackpot. Each row represents one of the conditions for intelligent life that a successful universe must have. The chance of any one row having all matching symbols is very low, only about 1 in 1,000,000. To win the jackpot (which in this case is a universe that has the right conditions for intelligent life), each of the rows must be

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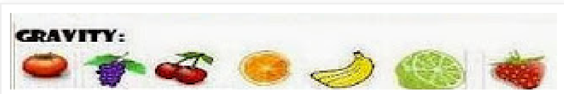
  - August (8)
  - July (8)
  - June (8)
  - May (8)
  - April (8)
  - March (9)

successful, consisting of all matching symbols. There are multiple possible combinations that allow for success (such as all apples on the first row, all pears on the second row, and all grapes on the other rows, or all 7's on the even rows and all oranges on the odd rows). But still the chance of overall success (each row being successful) is very, very low. The slot machine would look something like the slot machine shown below (click on the image to expand it).

Now let's take a look at each of the rows on this slot machine, and discuss the habitability condition that the row represents, including a mention of why the chance of the condition being met is roughly as improbable as the chance of getting all matching symbols on the row when you pull the red slot machine lever in the slot machine I have depicted.



The word gravity in the visual refers to the universal gravitational constant of 6.6 X 10^{-11} N·$(m/kg)^2$ which defines the degree to which matter attracts other matter through gravitational attraction. The existence of intelligent life in our universe requires the gravitational constant to exist within a narrow range of values. Cosmologists say that if the gravitational constant had been much greater, the expansion of the universe would have been stopped by the gravitational attraction between galaxies, and the universe would have collapsed in on itself before there was time for life to evolve. If the gravitational constant were much weaker, there would not have been enough gravitational attraction for galaxies to form.

Referring to the short-lived stars known as blue giants (which don't last long enough to support planets where life evolves),

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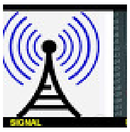
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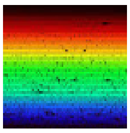
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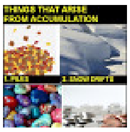
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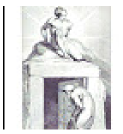
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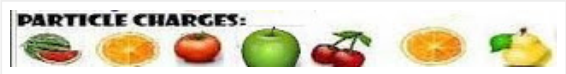
and to the type of stars known as red dwarfs (generally regarded as being stars not as suitable for Earth-like planets as yellow stars like our sun), the physicist Paul Davies says on page 73 of *The Accidental Universe*: "If gravity were *very* slightly weaker, or electromagnetism *very* slightly stronger (or the electron slightly less massive relative to the proton), all stars would be red dwarfs. A correspondingly tiny change the other way, and they would all be blue giants." So apparently our universe lucked out with its gravitational level, and this was at least as lucky or improbable as a row match on the slot machine I have visualized.

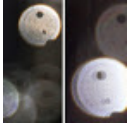


In our universe we have the remarkable coincidence that the proton (which has a mass 1836 times greater than an electron) has an electric charge identical to the charge of an electron, the only difference being that the proton charge is positive and the electron charge is negative. The charge of the proton is $1.60217657 \times 10^{-19}$ coulomb, and the charge of the electron is $-1.60217657 \times 10^{-19}$ coulomb. This scientific paper is by a scientist who used a molecular beam deflection method to conclude that the proton charge and the electron charge have a magnitude differing by less than 5 parts in 10,000,000,000,000,000,000.

The chemistry on which life depends could not exist if the magnitude of the charge on the electron did not match the magnitude of the charge on the proton. It would require only a small difference between the two to make planets unstable (not surprising because electromagnetism is a force more than a trillion trillion trillion times greater than the gravity that holds our planet together).

In his book The Symbiotic Universe, astronomer George Greenstein (a professor emeritus at Amherst College) says this about the equality of the proton and electron charges: "Relatively small things like stones, people, and the like would fly apart if the two charges differed by as little as one part in 100 billion. Large structures like the Earth and the Sun require for their existence a yet more perfect balance of one part in a billion billion."

In any universe containing life, the electron could have any old charge, as long as the magnitude of the charge exactly matched the magnitude of the charge of the proton. The fact that both match exactly is unexplained by the Standard Model of Physics. So a habitable universe requires a lucky match of the proton and electron charges, which is at least as improbable as the



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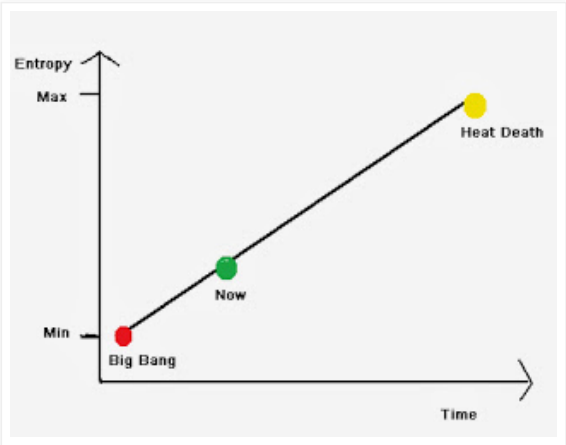
- Why Are Our Genomes Smaller Than a Lily's, and Our Brains Smaller Than a Caveman's?
- Cosmic Coincidence Cover-up
- The Gigantic Missing Link of Biological Life

likelihood of a match on the "Particle Charges" row on the slot machine I have depicted.

Entropy can be roughly defined as the amount of waste mass-energy in a system or universe, energy that is unavailable for work. Entropy is increased when the stars burns up their nuclear fuel to radiate energy into space, and it is also increased when matter gets trapped in black holes. It is a fundamental law of nature that entropy gradually increases as time passes, a principle known as the Second Law of Thermodynamics. Scientists say this law will eventually lead in the incredibly distant future to a "heat death" of the universe, in which there is no usable energy. We know roughly how much entropy is now in the universe, and if we "rewind the film" backward all the way back to the time of the Big Bang, we then have a universe that begins with very, very little entropy. The diagram below illustrates the point.



Roger Penrose (one of the most famous cosmologists) has emphasized the fantastic specialness of the low-entropy state of the early universe. In the video clip below, he discusses the issue.

http://www.youtube.com/watch?v=GvV2Xzh11r8

At the end of this brief clip Penrose estimates that the chance of a random universe having entropy as low as the entropy in the early universe is some inconceivably small number such as 1 in 10^N, where N is a number greater than the total number of particles in the observable universe. By comparison with such conclusions, the "entropy" slot on our cosmic slot machine is very modest, requiring luck of only about 1 in a million for this condition to be met. This is probably a great underestimation of the luck actually required for the initial entropy of a life-bearing

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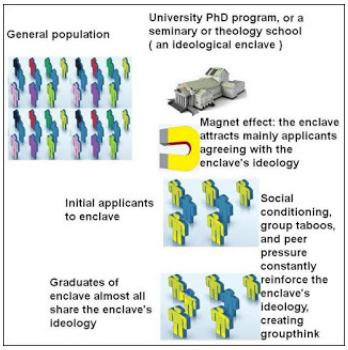
Why a Clique of Scientists Might Do Worse at Judging Truth Than a Jury

When newly awarded PhD's start writing papers and books and judging truth, they are rather like jurors who have been methodically expos...



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Labels

- 3D printing (1)
- abundance (1)
- acupuncture (1)

universe, but at least it means we don't have to depict a slot machine with a row stretching on for many miles.

The expansion rate is the rate at which an expanding universe expands. Around 1975 cosmologists said there was a problem called the flatness problem, which is the fact that in order for the universe to be in its current state the initial expansion rate of the universe (at the time of the Big Bang) had to be fine-tuned to about 1 part in 10^{50}. Then the theory of cosmic inflation was developed, which offered a mechanism that might explain why the universe had such a suitable initial expansion rate. But even with such a theory, it is still a very long shot for a universe to start out with an expansion rate suitable for habitability.

For one thing, lots of conditions have to be met for cosmic inflation to occur, and leave us with a universe like ours; so any inflation theory requires its own type of fine-tuning – perhaps not as much as 1 part in 10^{50} but still something on the order needed to win a huge lottery jackpot. In this paper Cal Tech professor Sean Carroll says, "When perturbations are taken into account, inflation only occurs in a negligibly small fraction of cosmological histories," and then defines this fraction as a number much less than 1 in 1,000,000,000,000,000,000,000,000. Princeton professor Paul Steinhardt has recently raised many objections to the inflation theory in this paper, claiming that cosmic inflation requires fine-tuning to 15 decimal places (a 1 in 1,000,000,000,000,000 bit of luck). So without discounting the possibility that the theory of cosmic inflation is correct, we can say that with or without inflation, to have a universe begin by chance with an expansion rate suitable for intelligent life we need something to happen at least as lucky as about a 1 in a million long shot, which is about the luck requirement depicted in my slot machine visual for the "Expansion Rate" row.

Dark energy (basically the same as the cosmological constant) is one of the great unsolved mysteries of the universe. It's not simply that we don't know enough about it. The mystery is that dark energy in our universe is so small, even though quantum field theory suggests it should be so much larger. Scientists say that quantum uncertainty should cause an ordinary vacuum to be teeming with short-lived, fleeting particles called virtual particles. Those particles should give an ordinary vacuum a very

- age of mankind (1)
- age of universe (3)
- aging (1)
- alien attack (1)
- alien computer simulation (4)
- alien spaceships (1)
- alien visitation (1)
- alternate universe (1)
- android (1)
- anecdotal evidence (2)
- animals (1)
- anthropic principle (21)
- antimatter (3)
- apocalypse (5)
- apparition (33)
- argument against brain storage of all memories (18)
- argument for soul (16)
- argument from evil (3)
- artificial intelligence (5)
- artificial planets (1)
- artificial worlds (1)
- asteroid mining (1)
- astroengineering (3)
- astronomy (9)
- atheism (2)
- augmented reality (2)
- austerity (1)
- Australian mystery lights (1)
- automation (2)
- behavior genetics (1)
- Bible (1)
- BICEP2 (10)
- biconsciousness (1)
- Big Bang (29)
- biocentrism (1)
- biology (6)
- biomedical research (3)
- Black Holes (4)
- body enhancements (2)
- body transplants (2)
- Boltzmann brain (2)
- books by Mark Mahin (3)
- boondoggle (2)
- bouncing universe (1)
- brain (43)
- brain experiments (1)
- brain imaging (1)
- brain paradoxes (4)
- brain replacement (2)
- brain research (6)
- brain scanning (3)
- brain stimulation (1)
- Brane cosmology (1)
- c-value paradox (1)
- Cambrian Explosion (5)

high energy density. When scientists do the calculations, they come up with a number indicating that ordinary space should be filled with a vacuum energy density more than 10^{100} times greater (more than a million billion trillion quadrillion quintillion sextillion times greater) than the maximum value consistent with astronomical observations (a problem known as the "vacuum catastrophe"). The simplest explanation is that there is some lucky balancing by which negative contributions to the vacuum energy density cancel out positive contributions, resulting in a net value near zero. But such a lucky balancing is incredibly improbable (far more improbable than the chance that all of the money you earned in a particular decade matches to the penny, by coincidence, all the money that you spent or charged in that decade). Some think it actually required a 1 in 10^{100} long shot for dark energy to be so small, but in the "Dark Energy" line of my visual I merely imagine a requirement that has about a 1 in a million chance of occurring.

In his book *The Particle at the End of the Universe* (page 145 to 146), Cal Tech physicist Sean Carroll says the following:

The size of atoms...is determined by...the mass of the electron. If that mass were less, atoms would be a lot larger. .. If the mass of the electron changed just a little bit, we would have things like 'molecules' and 'chemistry', but the specific rules that we know in the real world would change in important ways...Complicated molecules like DNA or proteins or living cells would be messed up beyond repair. To bring it home: Change the mass of the electron just a little bit, and all life would instantly end.

Besides the luck involved in the electron mass having a suitable value, our universe also had great luck in regard to the neutron mass having a suitable value. Physicist Paul Davies says that if the neutron mass were .998 of its actual value, protons would decay into neutrons, and there would be no atoms at all (*The Accidental Universe*, page 65). Conversely, if the neutron mass were slightly greater, it would mean there could be no long-lived stars like the sun.

So we can conclude that having electron and neutron masses with values compatible with life requires good luck on the same order as the luck needed for a match on the "Particle Masses" row of the slot machine I have visualized.

- car culture (1)
- cells (4)
- certainty (1)
- China (2)
- Christmas (1)
- cinema technology (1)
- coincidences (3)
- complexity (1)
- computationalism (3)
- computer simulations (3)
- conformity (1)
- consciousness (36)
- consumption (5)
- coronavirus (5)
- cosmic acceleration (2)
- cosmic background radiation (4)
- cosmic destiny (2)
- cosmic evolution (2)
- cosmic fine tuning (45)
- cosmic habitability (5)
- cosmic history (1)
- cosmic inflation (19)
- cosmic layers (1)
- cosmic life-force (1)
- cosmic message (1)
- cosmic mysteries (10)
- cosmic religion (1)
- cosmic structure (3)
- cosmic wonder (1)
- cosmological constant (4)
- cosmological natural selection (3)
- cosmology (75)
- cryonics (2)
- crystal gazing (1)
- cyborg (1)
- cyclical universe (4)
- dark energy (7)
- dark genome (1)
- dark matter (15)
- Darwinism (29)
- data dredging (1)
- dating (1)
- deathbed vision (4)
- definition of religion (1)
- definition of science (1)
- depression (1)
- Detroit (1)
- diet (1)
- disasters (1)
- disease prevention (1)
- disintegrating asteroid (1)
- DNA (11)
- dogs (1)
- double standards in science (3)
- doubt (1)

After the Big Bang, there was only hydrogen, helium, and a little lithium. All of the other elements were produced inside of stars. Advanced life requires lots of carbon, oxygen, and nitrogen. Having a civilization requires additional elements such as iron. Astronomers say that some of the elements originated in stars that did not blow up, and others originated in stars that did blow up in supernova explosions. A universe must meet many requirements to get all the needed elements in abundant amounts. For one thing, there has to be something like the weak nuclear force that exists in our universe, because that is needed for supernova explosions. Another thing needed are just the right nuclear resonances, which have to exist in the right way to assure the abundant production of carbon and oxygen by stars. In this paper scientists conclude, "Thus, even with a minimal change of 0.4% in the strength of the N-N force, carbon-based life appears to be impossible, since all the stars then would produce either almost solely carbon or oxygen, but could not produce both elements." So the total luck needed for you to have a universe with a distribution of elements suitable for the evolution of life (with abundant carbon and oxygen) would seem to be something like the luck required to get a match on the "Element Abundances" row of the slot machine I have visualized.

The two fundamental nuclear forces in our universe are the weak nuclear force (involved in radioactivity) and the strong nuclear force (which holds together the nucleus of an atom). The nucleus of atoms such as carbon consists of neutrons with no charge and protons with a positive charge. All particles with the same charge repel each other, particularly when they are very close together. So if it were not for the strong nuclear force, the nucleus of an atom such as carbon and oxygen could not exist for more than a second; the electromagnetic repulsion of the protons would cause the nucleus to fly apart.

In his book *The Accidental Universe* physicist Paul Davies says that if the strong nuclear force were 5 percent weaker, the deuteron (a nucleus consisting of a proton and a neutron) could not exist, making it "doubtful if stable, long-lived stars could exist at all." He also notes that if the strong nuclear force were 2 percent stronger, a nucleus called a diproton (consisting of only two protons and no neutrons) would exist, making it doubtful that "any hydrogen would have survived beyond the hot

- dowsing (1)
- dreams (7)
- drones (1)
- dwarf galaxies (1)
- dwarf galaxy rotation anomaly (1)
- dystopia (1)
- early habitability epoch (1)
- early Universe (2)
- easy life hypothesis (3)
- education (3)
- elections (1)
- electromagnetic pulse attack (1)
- electromagnetism (4)
- electrons (3)
- EmDrive (1)
- emergence (1)
- EMP (1)
- end of the world (5)
- energy crisis (3)
- energy forecast (1)
- energy production (2)
- engrams (12)
- entropy (3)
- environmental degradation (5)
- epigenetics (1)
- ESP (32)
- esthetics (1)
- Ethics (6)
- Europa (2)
- evolution (51)
- experts (9)
- extent of paranormal beliefs (1)
- extrasolar planets (7)
- extraterrestrial life (41)
- extraterrestrials (30)
- faint young sun paradox (2)
- fast radio bursts (1)
- fate of the universe (1)
- Fermi's paradox (7)
- fine-tuned universe (7)
- Flynn effect (1)
- forecasting (1)
- Fourth Dimension (1)
- free will (3)
- fundamental constants (5)
- fundamental forces (4)
- funerals (1)
- future contrasts (2)
- future entertainment (2)
- future eras (1)
- future happiness (2)
- future movies (1)
- future of consciousness (2)
- future of man (18)

primeval phase" near the time of the Big Bang (and also causing all kinds of problems for the existence of stars like the sun). So it seems that the strong nuclear force had to exist within a very small range of values. Since the strong nuclear force is roughly a million billion trillion trillion times stronger than gravitation, we can conclude that having the strong nuclear force fall within this narrow range required luck at least as great as the luck needed for a match on the "Nuclear Forces" row of the slot machine I have depicted.

By now I have discussed each of the requirements depicted on my slot machine visual, and how each one represents a very unlikely long shot or coincidence. What is the overall probability of all of these eight long shots occurring? The conditions are all independent requirements, without any causal relation to each other. If one requirement is met, it does not make it more likely that another requirement will be met. The rules of probability indicate that to calculate the likelihood of a set of independent events occurring, you multiply together the likelihood of each separate event or condition occurring. The likelihood of success for each condition is no greater than 1 in a million, so to roughly calculate the chance of all of the conditions being met, we multiply 1 in a million by itself eight times. This gives us a probability of 1 chance in 1,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000. That is the probability mentioned near the top of my slot machine visual, where it says, "1 winner every 1,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000 tries!"

If we imagine someone pulling the lever on this cosmic slot machine, we must imagine him pulling the lever over and over again for many, many centuries before success is finally reached, and each row on the machine consists of all the same symbols. A person pulling the red lever over and over again 24 hours a day would see one successful row every few days, a row consisting of all matching symbols (such as all apples). But that would only be one of the eight successful rows needed to win the jackpot, and it would be overwhelmingly probable that the same row would be unsuccessful the next time the person pulled the red lever. The person pulling the red lever over and over would probably need to pull the lever for many centuries before he saw that each of the rows consisted of all matching symbols, and the grand jackpot (a habitable universe) was won.

Posted by Mark Mahin at 7:46 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmology, fine-tuned universe, particle physics, philosophy

Saturday, September 28, 2013

- future problems (4)
- future risks (2)
- future technology (11)
- future weapons (1)
- futurology (2)
- galactic empire (1)
- galaxies (5)
- galaxy formation (6)
- galaxy spin anomaly (1)
- gamma ray bursts (2)
- genes (10)
- genetic engineering (10)
- genetics (9)
- geoengineering (2)
- ghosts (28)
- ghosts. (1)
- global consciousness project (2)
- global food supply (5)
- global warming (22)
- GMO (3)
- God (2)
- Great Filter (2)
- grey goo (1)
- groupthink (4)
- habitable zone (1)
- hallucinogenic drugs (1)
- happiness (1)
- heart attack risk (1)
- heritability of intelligence (1)
- hierarchy problem (1)
- Higgs mass (1)
- higher dimension (1)
- holographs (1)
- homeopathy (2)
- homochirality (2)
- homosexuality (2)
- human body plan (1)
- human extinction (2)
- human history (1)
- human intelligence (4)
- human knowledge (1)
- hurricanes (1)
- hypermnesia (1)
- hyperthymesia (2)
- hypnotic trance (4)
- idealism (3)
- immortality (3)
- inflation theory (6)
- information (1)
- integrated information theory (1)
- interplanetary travel (1)
- interstellar colonization (3)
- interstellar communication (1)
- interstellar radio communication (1)

Was Our Universe Infected by a Viral Multiverse?

Numerous scientists have said in recent decades that our universe seems to be "just right" in terms of having laws, forces, and constants that allow for the evolution of intelligent life. We see in our universe numerous examples of fine-tuning where some number in nature improbably exists within a tiny range of values that are compatible with the existence of intelligent life. Scientists say that tiny changes in the fine structure constant, the vacuum energy density, the strong nuclear force, the gravitational constant, or the mass of quarks would throw things off so that creatures like us would never have appeared. We have one dramatic example of this fine-tuning in the fact that each proton has an electric charge exactly equal in magnitude (to 18 decimal places) to the electric charge of each electron, even though each proton is 1836 times more massive than each electron. This coincidence is unexplained by the standard model of physics, and if the equality did not exist, planets would not hold together. There is a similar dramatic coincidence involving the Higgs field, which (minus a floundering SUSY theory) seems to be fine-tuned to 30 decimal places, as discussed here, where a physicist says, "we need cancellation of all these different effects to one part in about 1,000,000,000,000,000,000,000,000,000,000." As if that wasn't enough, the vacuum energy density or cosmological constant is apparently between 10^{60} and 10^{120} times smaller than the value predicted by quantum field theory, suggesting some almost miraculous balancing act going on in the physics of our universe (as discussed here, where it is called the "worst problem of fine-tuning in physics"). These items and numerous similar items have been extensively discussed in recent decades by scientists, in pieces such as this one.

Now if there was not much substance to these indications of fine-tuning in our universe, they would have been brushed off and ignored by those who ponder the universe from a materialistic standpoint. Instead quite the opposite seems to have happened to a large degree. Rather than ignoring these indications of fine-tuning, many recent thinkers have let these indications drive them to a huge change in thinking: the assumption that there is a multiverse or ensemble of universes.

The idea behind the multiverse is that there are a huge collection of universes, presumably each with a random set of physical characteristics, laws, and physical constants. The person who advances such a concept uses it in an attempt to reduce the "miracle of habitability" of our incredibly improbable universe-- to make the ultimate "long shot" look like something that is likely to occur at least once. Assume that the chance of a random universe being compatible with the evolution of intelligent beings is only 1 in N, where N is some extremely high number. If we assume that there is a number of universes much greater than N (say N times 1000), than there might actually be a likelihood that some universe would purely by chance meet all of the requirements necessary for intelligent life.

Let us take a close look at this idea of a multiverse, and see whether it holds up to scrutiny, in terms of explaining anything. Before we can do that, we must carefully define some terms and principles.

When talking about probability, mathematicians use the term *trials* to mean something like an experiment in which different results can occur. A trial may or may not be a formal experiment. It might be something like a hand in a game of cards, a roll of the dice, a particular spin of a roulette wheel, or a particular swing of the bat while a baseball player is at bat. In talking about a possible ensemble of universes, then each different universe would be considered a trial.

- interstellar travel (8)
- Iraq war (1)
- Kepler Space Telescope (2)
- Kepler-78b (1)
- ketamine (1)
- lambda cold dark matter theory (5)
- language acquisition (1)
- Large Hadron Collider (2)
- laws of nature (5)
- LCDM theory (1)
- leisure (1)
- levitation (3)
- life after death (44)
- life extension (8)
- Long Baseline Neutrino Experiment (1)
- Mad Scientist (1)
- Many Worlds theory (6)
- Mars (11)
- Mars lights (4)
- Mars strange objects (8)
- materialism (7)
- materialism as religion (2)
- mathematical universe hypothesis (1)
- mathematics (2)
- meat consumption (1)
- medical technology (2)
- mediums (13)
- mega-tsunami (1)
- memory (41)
- memory implant (1)
- memory retrieval (3)
- memory traces (16)
- mental differences between animals and humans (1)
- meta-analysis (1)
- meteor (1)
- methodological naturalism (1)
- METI (1)
- mind (7)
- mind linking (1)
- mind uploading (5)
- mind-reading (3)
- miracles (1)
- missing heritability problem (1)
- molecular biology (2)
- MOND (1)
- morphic gravitation (1)
- morphogenesis (8)
- multiverse (21)
- mutations (1)
- mystery of existence (1)
- nanotechnology (1)
- natural history (3)
- natural selection (24)

Now let me define two important terms.

Term	Definition
Number of successful trails	The total number of successful trials in a series of random trials
trial success probability	The chance that a random trial will be successful. When there are a large number of trials, the trial success probability tends to be equivalent to the ratio between the number of trials that are successful and the number of trials that are unsuccessful

Here are some examples to clarify the use of terms.

Example 1: If one thousand raffle tickets are sold in a raffle, and a winner is selected from a barrel containing the stubs of all of these raffle tickets, then the number of successful trials will be 1 and the trial success probability is 1 in 1000. The number of successful trials is exactly one because there is only one winning ticket chosen. The chance of any ticket holder winning or the trial success probability is 1 in 1000.

Example 2: If I make three bets on some position of a roulette wheel with 38 positions, each time betting on a particular spin of the roulette wheel, then the trial success probability is 1 in 38, because on each spin of the wheel there is one chance in 38 of winning. The number of successful trials depends on chance. It could be as high as 3 if I am very lucky, or it could be as low as 0 if I am unlucky.

Now, what general principles can we state about the relation between the number of successful trials and the trial success probability? They are as follows:

Principle 1: *If the trial success probability is zero, the number of successful trials must be zero*. This simply means that if there is no chance of one trial being successful, there must be no successful trials.

Principle 2: I*f the number of successful trials is zero, it does not necessarily mean that the trial success probability is zero*. For example, in Example 2 above it is entirely possible that the number of successful trials might be zero, meaning the gambler loses on all three spins of the roulette wheel. But with each spin of the roulette wheel there is 1 chance in 38 of being successful; in other words the trial success probability is 1 in 38.

Principle 3: *In some cases increasing the trial success probability will tend to increase the number of successful trials, but an increase in the trial success probability will not always mean an increase in the number of successful trials*. For example, let us define a successful trial for a baseball hitter as hitting a home run. A hitter may improve his batting technique, thereby increasing the trial success probability, his chance of hitting a home run. That will tend to increase (over a long enough time) the batter's number of successful trials, or number of home runs, but is not guaranteed to do so during a particular number of trials.

Principle 4: *For random trials that do not involve practice at a skill, increasing the number of trials tends to increase the number of successful trials or make it more likely to be at least one, but increasing the number of trials does not increase the trial success probability*. For any random process such as the spin of a roulette wheel of the throw of a pair of dice, an increase in the number of trials or attempts may tend to increase the chance of one successful outcome (or increase the number of successful outcomes), but the number of trials or attempts does not tend to increase

- naturalism (2)
- nature (2)
- near death experience (21)
- Neptune (1)
- neuroscience (44)
- neutrino (2)
- neutron (1)
- non-local consciousness (1)
- nonneuralism (1)
- nuclear energy (2)
- nuclear war (4)
- nucleosynthesis (1)
- observer selection effect (1)
- ocean acidifcation (1)
- optogenetics (1)
- orbs (9)
- origin of biological complexity (12)
- origin of language (7)
- origin of life (33)
- origin of man (6)
- origin of Mind (13)
- origin of sex (1)
- out-of-body experience (2)
- overblown hype (23)
- overconfidence (6)
- overconsumption (9)
- overpopulation (8)
- overshoot and collapse (1)
- p-hacking (1)
- P/2013 R3 (1)
- paleontology (1)
- pandemic (2)
- panpsychism (4)
- panspermia (4)
- paradoxes (1)
- parallel universes (3)
- paranormal phenomena (92)
- paraverse (1)
- pareidolia (1)
- particle collisions (1)
- particle physics (14)
- peak coal (3)
- peak oil (5)
- peer review (1)
- phantom events (1)
- philosophical zombie (1)
- philosophy (33)
- philosophy of mind (18)
- philosophy of science (3)
- photography (2)
- physicalism (2)
- physics (20)
- pigs (1)
- planetoids (1)
- plant intelligence (1)
- pollution (4)

the chance of success on any random one of the trials, that is the trial success probability. The one exception to this principle is that when the trials involve a human practicing, the chance of success on one trial may actually increase, because of the tendency of a human to improve with practice.

Now let us look at how all of this is relevant to the theory of a multiverse. The theory of a multiverse is that there are multiple universes, each with a different random set of characteristics. Speaking in terms of probability theory, each of these universes may be considered a separate trial. The series of trials in this case is the entire ensemble of universes, or multiverse. The theory has been introduced to try to explain why a universe such as ours (which looks like an incredibly improbable long shot) might exist.

General Term	**Meaning in This Case**	**Normal Thinking**	**Multiverse Theory**
Number of trials	Number of universes	1 (?)	Very many
Number of successful trials	Number of habitable universes with life	1 (?)	Many
trial success probability	The chance of any one random universe being habitable	Incredibly small number such as 1 in a billion trillion quadrillion	Incredibly small number such as 1 in a billion trillion quadrillion

The last line in this table indicates why the multiverse theory (at least in its simple form) is a total bust, dud, and failure from an explanatory standpoint. Because of Principle 4 described above, the multiverse theory leaves us with a trial success probability that is not any higher than the incredibly low number we started out with. If the chance of our universe randomly being habitable is something like 1 in a billion trillion quadrillion before we think about a multiverse, then we have exactly the same incredibly small number after we adopt the multiverse theory.

In other words, the multiverse theory does nothing to make the “miracle of habitability” of our universe seem any less miraculous. It's the same type of “ten consecutive royal flushes in spades” type of unlikelihood, even after we adopt a multiverse. The longest of long shots of our universe being habitable is just as long a long shot even after we assume a multiverse.

To help clarify how great a weakness this is in the multiverse theory, let us look at a wildly speculative theory that would not suffer from such a defect (although it would suffer from a different problem). I can call this fanciful theory the *viral multiverse theory*. The theory can be fancifully expounded as follows:

Once upon a time there were a vast number of uncreated universes, each with a different random set of characteristics. Purely by chance, one of these universes was habitable for intelligent life. Then, through some weird strange process, that universe infected another universe with its favorable physics, making that universe habitable. Then the infected universe itself infected another universe with its favorable physics. Habitability thereby spread like a virus throughout all of the ensemble of universes. When this long infection period ended, every single universe in the vast ensemble of universes was habitable.

- polygamy (1)
- pork eating (1)
- post-scarcity economy (1)
- precognition (11)
- predictions (4)
- primordial fluctuations (1)
- primordial singularity (1)
- problem of evil (5)
- prognostication (2)
- programmed material universe (8)
- protein folding (4)
- psychokinesis (2)
- psychology experiments (1)
- psychometry (1)
- pulsars (1)
- qigong (1)
- quantum biology (1)
- quantum computer universe (1)
- quantum gravity (1)
- quantum mechanics (6)
- quasar polarization vector alignments (1)
- quasars (1)
- racism (1)
- radical abundance (1)
- random universes (2)
- randomness (2)
- receptacle theory of consciousness (3)
- recolonization of Earth (1)
- recommended books (10)
- Reddit (1)
- reductionism (2)
- reincarnation (3)
- rejuvenation (2)
- remote viewing (7)
- reproducibility crisis (2)
- requirements underestimation (4)
- resource depletion (5)
- retrocognition (1)
- RNA world hypothesis (1)
- robotics (3)
- robots (14)
- rogue planet (1)
- savants (4)
- scarcity (1)
- science and ethics (2)
- science and religion (1)
- science fiction (102)
- Science fiction stories (119)
- science fiction story (116)
- science journalism (5)
- scientific consensus (3)
- scientific explanation (2)
- scientific explanations (7)

Now let's expand the previous table to include this fanciful theory.

	Normal Thinking	**Multiverse Theory (Regular)**	**Viral Multiverse Theory**
Number of universes	1 (?)	Very many	Very many
Number of habitable universes with life	1 (?)	Many	Very many (all trials successful)
The chance of any one random universe being habitable (trial success probability)	Incredibly small number such as 1 in a billion trillion quadrillion	Incredibly small number such as 1 in a billion trillion quadrillion	100% (all universes end up habitable)

When we compare the regular multiverse theory to this viral multiverse theory, it helps clarify what an explanatory failure the regular multiverse theory is, and how lame the theory is from the standpoint of explaining anything. Fanciful and ridiculous as it may be, the viral multiverse theory leaves us with an explanation for why our universe is habitable, something which the regular multiverse theory completely fails to do (as the trial success probability does not change after we believe in a multiverse).

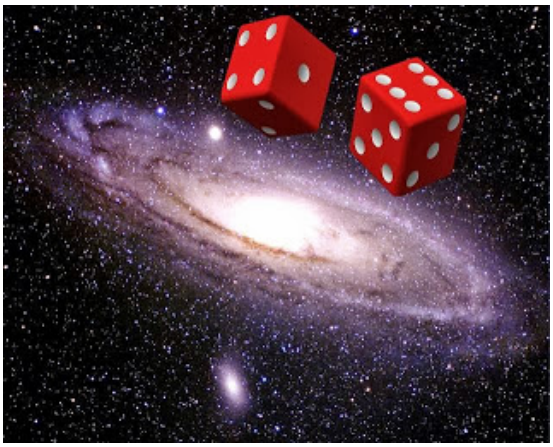
The believer in the viral multiverse theory can say, "Why of course our universe is habitable – all of the universes in the vast ensemble are habitable." The believer in the regular multiverse theory can say no such thing, and in that theory *our* universe being habitable is still the longest of long shots.

So why can't we just adopt a theory like this viral multiverse theory? It's because the idea of one universe infecting another universe with favorable physics is absurd. No one has the slightest idea of how one universe could infect another universe, causing the second universe to have favorable physics like the physics of the first universe. Imagining such a thing seems like an invalid case of applying an idea from biology into the realm of physics where it has no business existing. No one even has any workable idea of how there could be any contact whatsoever between one universe and another universe. Plus there are cosmological reasons for thinking that our universe has had favorable physics from its earliest beginning. Numerous scientists have noted that if the Big Bang hadn't been just right, the universe would either have expanded too fast for galaxies to form, or the universe would have collapsed in on itself or collapsed into black holes. So we can't really imagine that our universe started out as "any old universe" and then got its favorable physics long after it originated.

The multiverse enthusiast therefore has a Hobson's choice, a choice between equally unattractive alternatives. He can choose a regular multiverse theory which has no explanatory power because it does not change the incredibly low chance of our universe being habitable, or he can choose some weird variation of the multiverse theory that might explain why our universe is habitable, but at the price of requiring you to believe in some crazy, laughable idea such as a multiverse-wide viral cross-pollination of universe physics (or some other equally ludicrous and byzantine piece of conceptual baggage).

- scientific literature (2)
- scientific process (7)
- scientific speculation (9)
- scientific theories (5)
- scientific theory (5)
- scientist misconduct (1)
- scientist subculture (1)
- self (1)
- self-consciousness (2)
- sensationalism (1)
- SETI (15)
- sex (1)
- sexism (1)
- shopping (1)
- short radio bursts (1)
- simulated universe (6)
- Singularity (8)
- skepticism (9)
- slavery (1)
- social media (1)
- social security (1)
- social trends (1)
- sociology of science (12)
- software development (5)
- solar flares (1)
- solar system (1)
- soul (4)
- space colonization (2)
- space station (2)
- sports of the future (1)
- STARGATE program (1)
- starships (1)
- stem cells (1)
- string theory (6)
- subsidies (1)
- sun (1)
- supercomputer (3)
- superintelligence (7)
- supermen (2)
- supernovae (2)
- supersymmetry (9)
- surveillance state (1)
- synapse theory of memory (7)
- taxes (1)
- technological innovations (1)
- teleology (4)
- teleportation (1)
- theism (3)
- theories of mind (7)
- theories of the future (3)
- theories of the universe (4)
- theories of time (3)
- theories of truth (1)
- theory of accelerating progress (1)
- theory of consciousness (8)

So where does this leave the person who wishes to explain away the astonishing fine-tuning that our universe seems to have? That person is left in an uncomfortable place, stuck with a deep mystery ("the miracle of habitability") he can't explain away with a plausible physical theory that gets the job done with explanatory rigor.



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Posted by Mark Mahin at 10:23 AM No comments:

Labels: anthropic principle, cosmic fine tuning, cosmology, fine-tuned universe, multiverse, philosophy

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